



City of Seattle

BIM Standards



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SECTION 1: Information



1.0 INTRODUCTION

What is BIM?

Building Information Modeling (BIM) is a process of planning and collaboration for construction projects that is facilitated by modern digital technology on a Common Data Environment that provides integrations with other systems like geographic information systems (GIS) and enterprise asset management (EAM) systems.

BIM supports project development, inter-departmental planning, and key asset data tracking and integration.

Managing documents in a BIM document management system (Common Data Environment) has the following benefits:

- Easy access to design and construction documents in a centralized repository
- Document versioning
- Model coordination and clash detection
- Design and construction issue and markup tracking
- Design and construction document approvals

Purpose of Document

This document has been written to communicate requirements for City of Seattle project teams who are implementing BIM workflows and technology in-house and in partnership with consultants, contractors, and other agencies. For a list of updates, [see change log](#).



1.1 GLOSSARY OF TERMS

Here are some common terms that will be used throughout this document:

- **BIM Execution Plan (BIMxp)**: A BIM Execution Plan is a project support document generated by the City of Seattle to track assets and activities and facilitate data coordination by generating tailored project BIM standards.
 - **PTN**: “Project Tracking Number”, defined in the BIMxp.
 - **VPI**: “Vault Plan Index” number, acquired from the City of Seattle [Records Vault](#) (SeaDIR).
- **Civil Integrated Management (CIM)**: Method of integrating technology and managing data across systems.
- **Common Data Environment (CDE)**: the platform that the City of Seattle uses for project collaboration and delivery is *Autodesk Docs*® on the Autodesk Construction Cloud®.
- **Coordinate System (CS)**: The Citywide standard coordinate system is *HPGN (HARN) Washington State Planes, North Zone, US Foot* (code: *HARN/WO.WA-NF*; EPSG code: 2926).
- **Information Models**: Intelligent 3D models, such as Civil 3D® objects (Pipe/Pressure Networks, Feature Lines, Surfaces, Cogo Points, etc.), and Revit® and AutoCAD Plant 3D® models.
- **Project Deliverables**: The following deliverables are required, if defined in the project BIMxp:
 - **PDF sheets**: Plan sheets published in **PDF** format (must use COS-ROMANS.TTF).
 - **Project Asset List (PAL)**: “Vertical” (facility) asset list exported in **CSV** or **COBie** format, per the BIMxp.
 - **NWD models**: Federated 3D information models published in **NWD** format with materials applied.
 - **ArcGIS® data**: Geospatial “horizontal” (linear/conveyance) asset object data published to **ArcGIS**®.

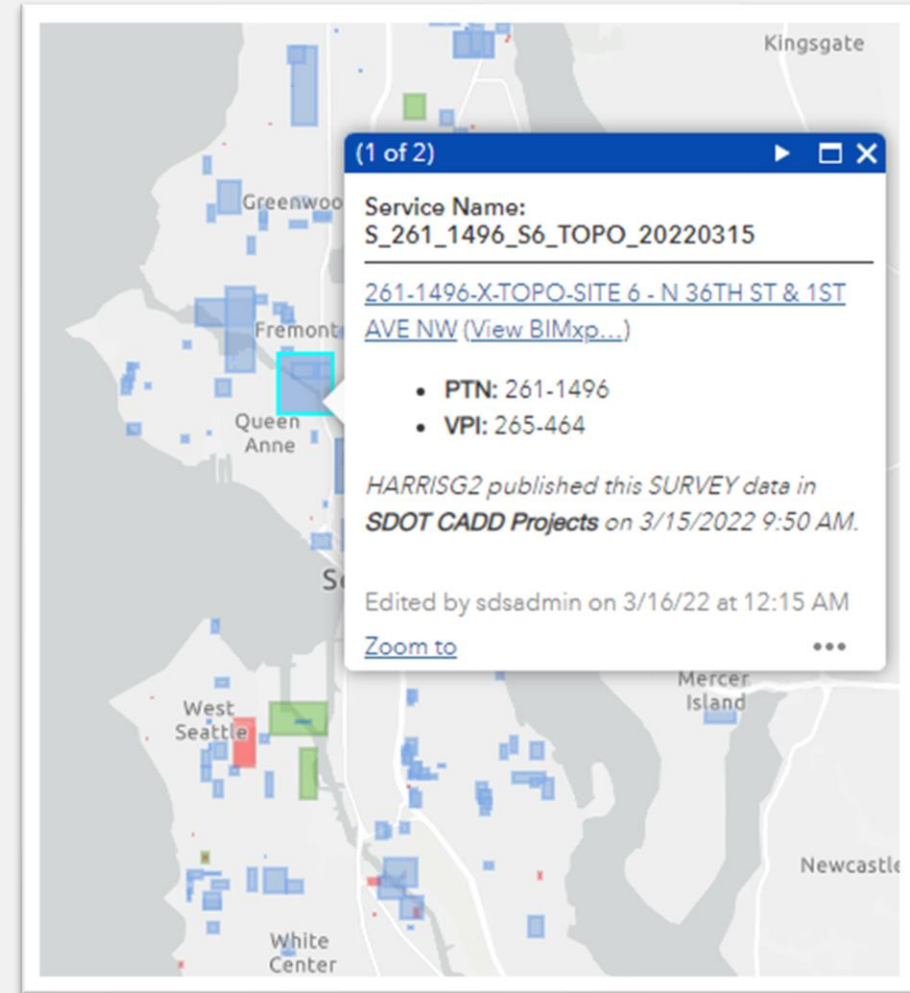
1.2 CIVIL INTEGRATED MANAGEMENT (CIM)

Civil Integrated Management (CIM) provides strategic planning and support to improve and accelerate project delivery across City of Seattle departments. The goal is to align systems and data to support desired business outcomes through standards and governance.

BIM standards provide the framework to support CIM by integrating technology and data through the following teams:

- Geographic Information Systems (GIS)
- Surveying and Mapping
- Engineering
- Construction

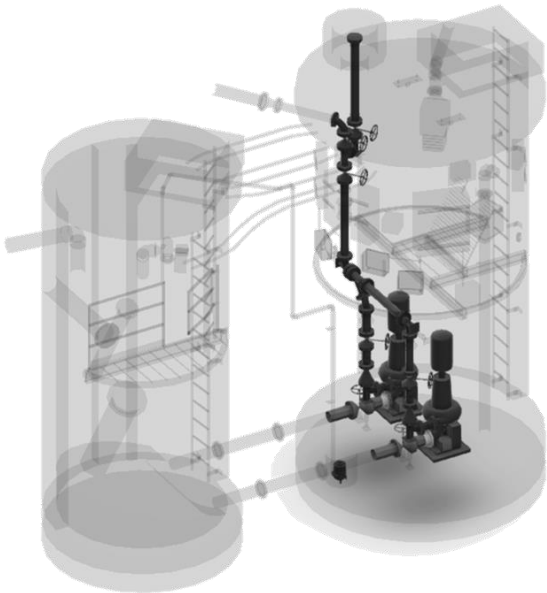
The [internal map](#) shown on the right illustrates how civil data is published and made available on the GIS platform for planning and analysis. It also cross-references the BIMxp for technical requirements, the PTN to access source surveying and engineering data, and the VPI for archived plan sets.



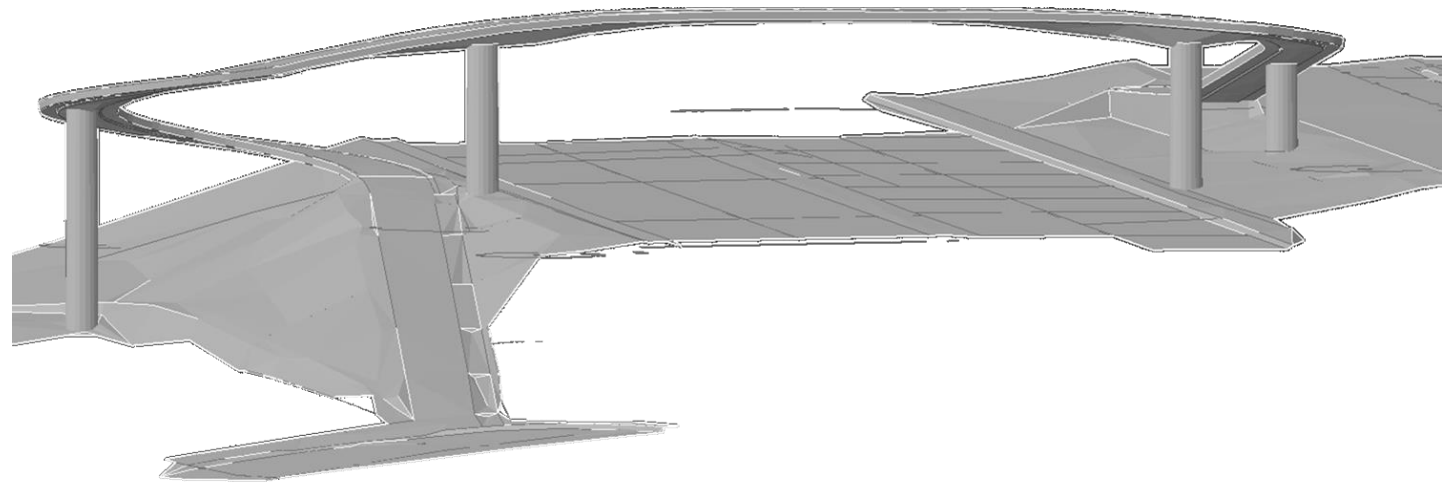
1.3 INFORMATION MODELS

Project deliverables like **PDF** sheets, **CSV** and **COBie** project asset lists, federated **NWD** models, and **ArcGIS®** data are generated from *information models*.

Utility Models



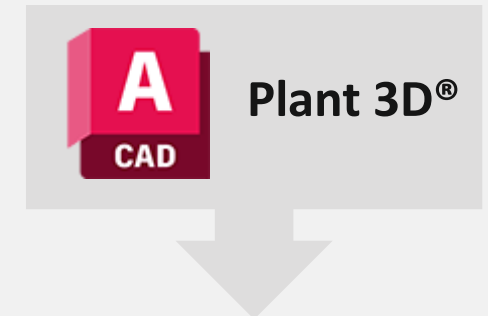
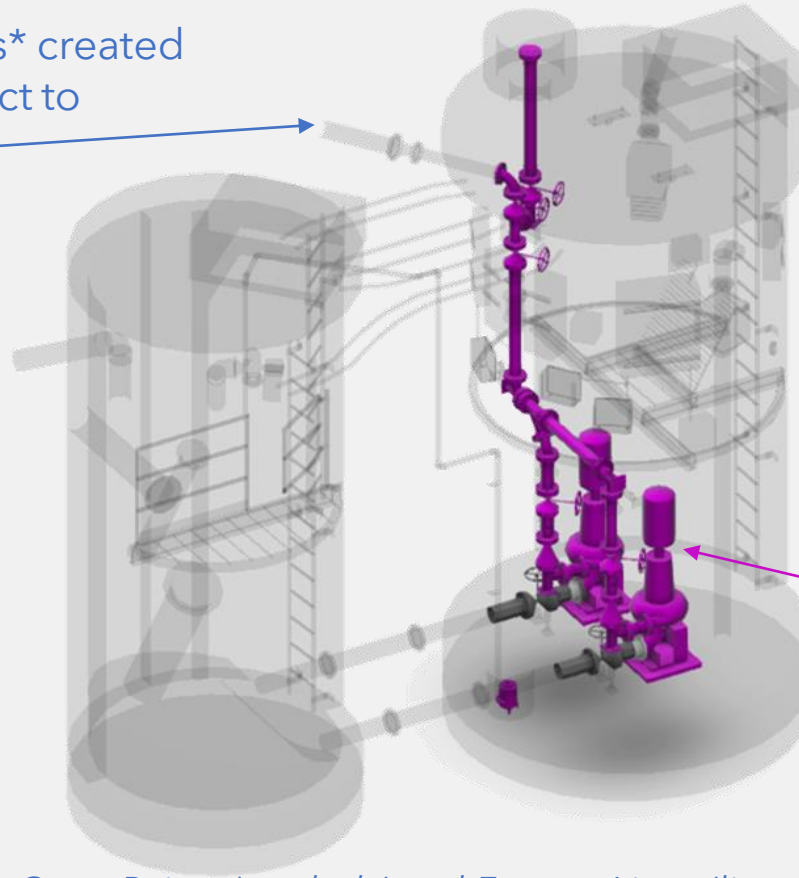
Transportation Models



1.3.1 HORIZONTAL & VERTICAL UTILITY INFORMATION MODELS

Applications used for creating utility information models include Autodesk Civil 3D®, Revit®, and AutoCAD Plant 3D®.

“Horizontal” (linear/conveyance) assets* created from Pipe or Pressure Networks connect to vertical assets located inside a facility.



“Vertical” assets are located inside a facility.

**additional geospatial assets are created with Cogo Points (symbols) and Feature Lines (linear features) to be published to GIS.*

1.3.2 TRANSPORTATION INFORMATION MODELS

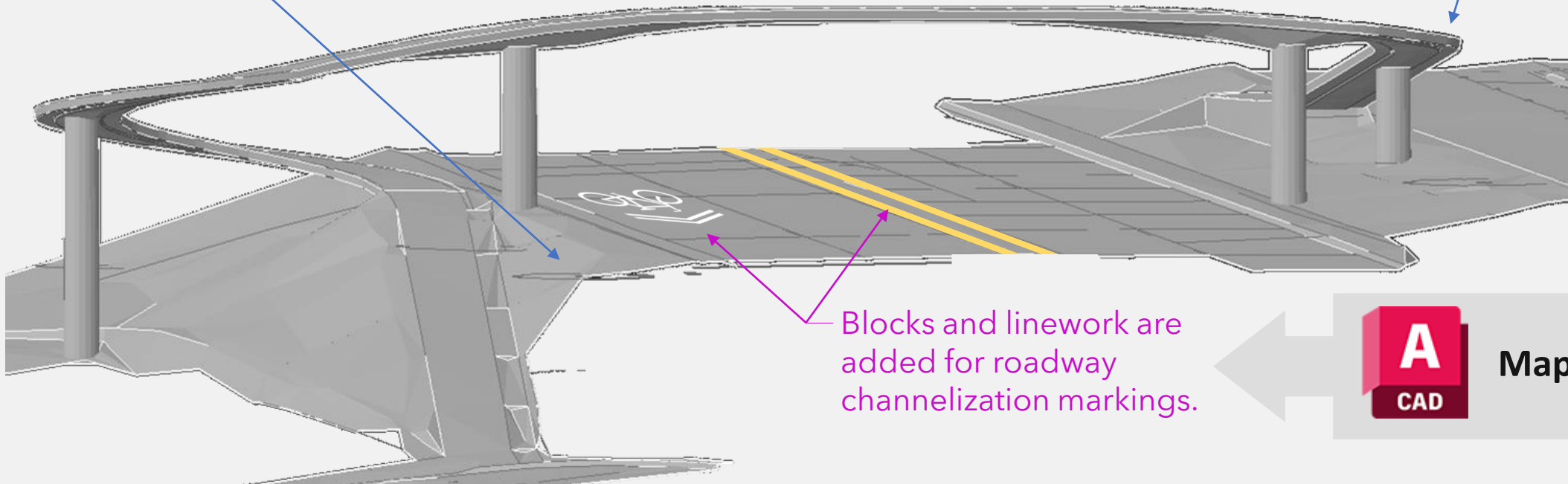
Autodesk Civil 3D® is used for creating transportation information models.

Cogo Points and Feature Lines are used to create symbols and linear features to be published to GIS.



Civil 3D®

Corridors, Grading Objects, 3D solids, etc. are used to generate transportation structures, surfaces, and material layers.



Blocks and linework are added for roadway channelization markings.



Map 3D®



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SECTION 2: Requirements



2.0 BIM REQUIREMENTS

- 1. Coordinate System:** A coordinate system (CS) must be assigned to all geospatial drawings and a common origin prism must be tied to the CS in facility models. The City of Seattle utilizes the standard *HPGN (HARN) Washington State Planes, North Zone, US Foot (EPSG code: 2926)* grid CS. If a ground CS is utilized on your project, it must be documented so the data can be transformed back to the standard grid CS.
- 2. Common Data Environment:** The project must be setup on Autodesk Docs® in coordination with the City of Seattle.
 - a) Autodesk Desktop Connector version updates must be coordinated with the project team.
 - b) Autodesk BIM Collaborate Pro is required for team members who create and manage project data.
- 3. Project Deliverables:** Software must be able to produce deliverables defined in the [BIMxp](#), including:
 - a) PDF sheets of plan set (must use [COS-ROMANS.TTF](#)).ⁱ
 - b) CSV of Project Asset List (PAL) for vertical (facility) assets.ⁱ
 - c) Federated 3D model in NWD format of utility and facility information models.ⁱ
 - d) Publish the following horizontal (linear/conveyance) assets with Autodesk Connector for ArcGIS:ⁱ



[Drainage and Wastewater \(DWW\):](#)

Civil 3D® Pipe Networks and Feature Lines



[Roadway Paving:](#)

Civil 3D® Feature Lines



[Roadway Signalization:](#)

Civil 3D® Feature Lines and Cogo Points



[Trees:](#)

Civil 3D® Cogo Points



[Water System:](#)

Civil 3D® Feature Lines and Cogo Points



[Roadway Channelization:](#)

AutoCAD Map 3D® Lines and Blocks



[Lighting Site:](#)

Civil 3D® Feature Lines and Cogo Points



[Irrigation System:](#)

Civil 3D® Feature Lines and Cogo Points



[Electrical Site:](#)

Civil 3D® Feature Lines and Cogo Points



[Curb Ramps:](#)

Civil 3D® Feature Lines



[Roadway Signage:](#)

Civil 3D® Cogo Points



2.0.1 a BIM BEST PRACTICES (1 OF 2)

Steps for Successful Project Delivery

- Go over the [submittal checklist](#) to ensure standards compliance before submitting deliverables for review.
- Become familiar with the CDE, [Autodesk Docs®](#), and how to [track issues](#) and [conduct reviews](#) on the platform.
- Learn how to conduct [design collaboration](#) and [model coordination](#) on the CDE.

Keep Drawings Clean

Be aware that inserting drawings and non-standard blocks may introduce clutter that affects drawing performance.

- In Civil 3D®, look for extraneous sites in the prospector and extended data in object properties.
- Purge unneeded layers, blocks, text styles, etc.

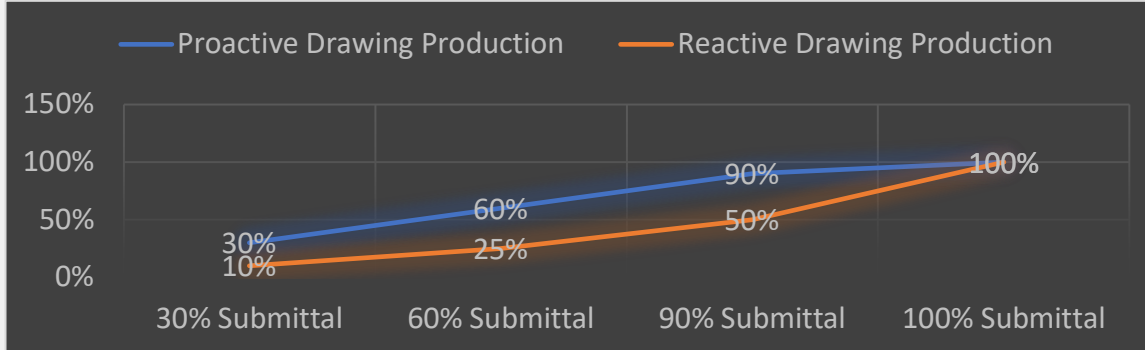
Proactive Approach to Projects

The goal is to be proactive, efficiently creating deliverables while reducing mistakes. A reactive approach costs more money and may cause more errors due to last-minute edits and changes.

The [graph on the next page](#) illustrates how taking a reactive approach tends to cause delays and is prone to errors, where-as taking a proactive approach helps teams produce targeted deliverables on time with less errors.



2.0.1b BIM BEST PRACTICES (2 OF 2)



The **orange line** in the chart shows a reactive approach, doing minimum work early on and delaying important design tasks to the end of the project. Problems with this approach include:

- Considerable work is left to the end of the project, often resulting in mistakes and schedule delays.
- Shortcuts are taken to save time, reducing the data quality.
- The project is prone to more change orders and design changes during construction.

The **blue line** in the chart shows a proactive approach, producing targeted deliverables on time. The proactive approach aims to complete the following work at standard milestones:

- Pre-30%: Develop a 3D base map with researched or verified depths of underground utilities that may cause conflicts during design.
- 30%: Develop sheet index table, create named plan views and set match line locations for all disciplines in the [X-VIEW drawing](#) and [setup sheets](#).
- 30%: Create 3D models of proposed features for clash detection and analysis (model coordination).
- 60%: Continue model coordination, determine proposed elevations, and create profiles and/or sections.
- 90%: Continue model coordination. Plan set must have all the elements of the final plan set and only minor changes should be made to reach 100%.

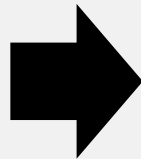
2.1 LICENSING OPTIONS

Autodesk Licensing (bring your own license model)

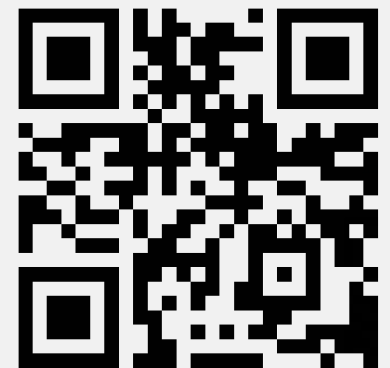
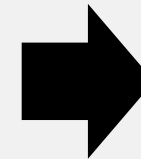
- Autodesk Docs® licensing is available with the Autodesk AEC Collection® (this includes Autodesk Civil 3D®), or standalone on an annual or monthly basis: <https://construction.autodesk.com/pricing/autodesk-docs/>
- Autodesk BIM Collaborate Pro® licensing is available on an annual or monthly basis: <https://construction.autodesk.com/pricing/autodesk-bim-collaborate/>
- Autodesk desktop software is available with maintenance subscriptions or with Autodesk Flex licensing to pay as you go: <https://www.autodesk.com/benefits/flex>

Esri ArcGIS® Licensing (City of Seattle provides accounts to publish geospatial data to ArcGIS®)

City of Seattle Internal Staff
[Account Setup Form](#)



External Partner
[Account Application Form](#)

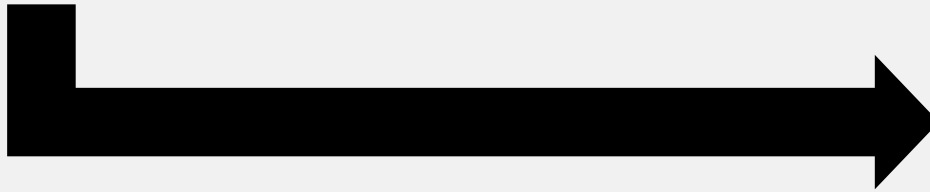




2.2 BIM EXECUTION PLAN (BIMxp)

A BIM Execution Plan (BIMxp) documents specific information modeling requirements for a project. City of Seattle project leads (internal staff) must generate a BIM Execution Plan and [make modifications](#) in coordination with the project team.

[BIM Execution Plans \(sharepoint.com\)](#)



BIM Execution Plans gives the ability to right-size project requirements and they are important for three primary reasons:

1. project delivery (planning and coordination)
2. asset management (key asset publishing and integration)
3. as-built tracking (coordination and compliance)





2.2.1 BIM EXECUTION PLAN CONTENTS

The BIMxp must contain the following content to define project requirements:

- Project Information
- List of team contributors, including the BIM Manager (Project Administrator), PM, PE, and Model Element Authors (MEAs)
- Model Progression Matrix defining the required information models and the levels of development
- Common Data Environment (CDE) requirements
- Team learning recommendations
- Civil infrastructure information modeling requirements
 - Coordinate system
 - Existing conditions modeling requirements
 - Proposed modeling requirements
 - Key asset types to be published to GIS
- Vertical asset information modeling requirements (if applicable)
- Project coordination requirements
- Deliverables

Once the project is setup, save the draft BIMxp to the project; see [Section 2.3.2](#)



2.2.2 BIM EXECUTION PLAN WORKFLOWS

A BIM Execution Plan (BIMxp) is a project communications tool:

- A BIMxp is created to [communicate documented project requirements with the project team](#).
- Seattle IT sends communications to BIMxp authors about [updates to software versions](#) and centralized support files.
- Seattle IT sends automated quarterly check-in notifications to BIMxp authors to remind about publishing geospatial data to GIS at required milestones.

1) PROJECT INITIATION

- A. Project initiator creates the draft BIMxp.
- B. A BIM Manager (project administrator) is assigned to the project.
- C. The BIM Manager acquires PTN and documents it in the BIMxp.
- D. The BIM Manager sets up the project on the CDE and adds team members.
- E. The BIM Manager works with the project manager and project engineer to document special requirements in the BIMxp.
- F. The BIM Manager communicates project requirements with project team (orientation meeting).

2) PROJECT DELIVERY

- A. The project team publishes PDFs for milestone reviews as documented in the BIMxp.
- B. A Vault Plan Index (VPI) number is acquired at the 60% milestone and is:
 - I. documented in the BIMxp
 - II. added to the sheets
 - III. added to the geospatial drawing properties (command: *DWGPPOPS*)
- C. The project team [publishes geospatial data to GIS](#) at milestones documented in the BIMxp.
- D. The BIM Manager transmits [PDFs](#) to SeaDIR and the construction team.

3) PROJECT CLOSEOUT

- A. The project team documents revisions, addendums, change orders, etc.
- B. The project team transmits snapshot of sheets (and references) to the *06-Record* folder and disconnects reference templates.
- C. The construction team creates as-built redlines and sends to project team.
- D. The project team updates Record Drawing [PDFs](#) (and [federated models](#), if applicable) and sends to SeaDIR.
- E. The project team [publishes as-built geospatial data to GIS](#).
- F. The BIM Manager marks the BIMxp as “complete”.

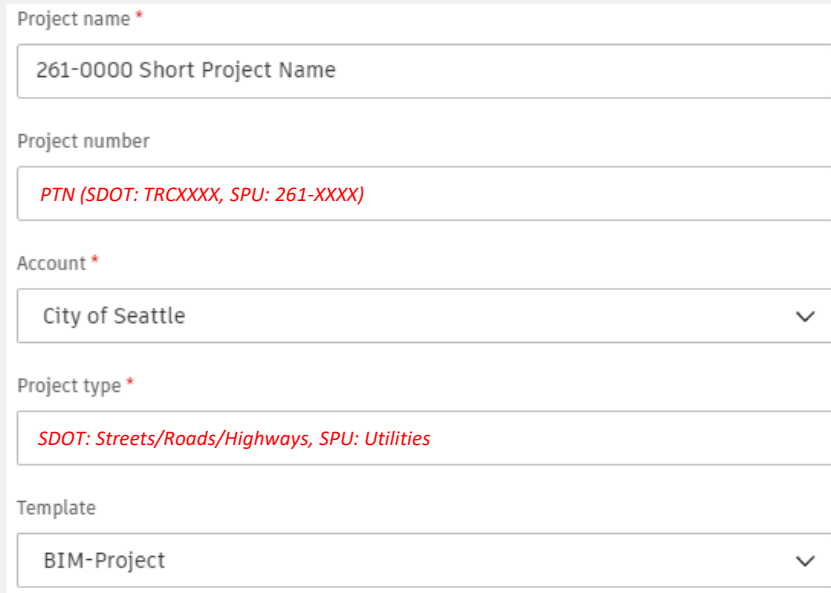


2.3 BIM PROJECT SETUP

BIM Managers (project admins) have rights to create and manage projects in the CDE: the [Autodesk Construction Cloud](#)® (ACC) under the City of Seattle account.

Project Template

All projects must be created using the ACC template called *BIM-Project*. The required project fields are illustrated below:



Project name *

261-0000 Short Project Name

Project number

PTN (SDOT: TRCXXXX, SPU: 261-XXXX)

Account *

City of Seattle

Project type *

SDOT: Streets/Roads/Highways, SPU: Utilities

Template

BIM-Project

Project names must be as short as possible, prefixed with the Project Tracking Number (PTN) as defined in the BIMxp.

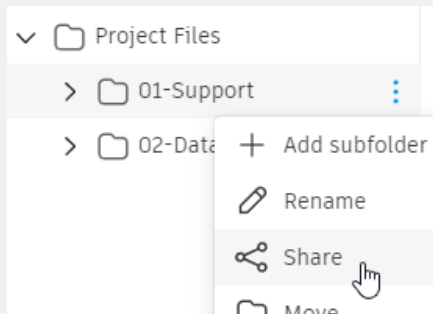
The project administrator must:

- Review the members list (external partners must fill out [this form](#) to be added to the City of Seattle ACC hub).
- Invite project team members and assign one of these roles to each member ([more info](#)):
 - BIM Manager (project administrator)
 - Drafter
 - Engineer
 - IT (account administrator)
 - Project Manager
 - Reviewer
 - Surveyor
- [Bridge the 01-Support folder](#) to the Civil project files folder and assign permissions for team member roles to access.

2.3.1 “BRIDGE” SUPPORT FOLDER

To provide the required resources for a project, the BIM Manager (project admin) must “bridge” the *01-Support* folder to their Civil project files folder.

1. Go to the [COS-Support](#) project and navigate to:
Docs → Files → Project Files
2. Share the *01-Support* folder...



...to “another project” as shown on the right.

- a) Check the “automatically sync updates to target project” box.
- b) Select the destination project.
- c) Select the project’s “Civil” folder.

Share with

- ☐ Project members with view-only access or higher
- ☐ Anyone with the link ⓘ
- ☒ Another project ⓘ

☒ Automatically sync updates to target project

Only changes to files in the selected parent folders will be updated. This does not include selected files, any subfolders, or files inside subfolders.

Title

Enter a title

Select project * ⓘ

261-0000 Example BIM Project

Select folder * ⓘ

Civil

Selected items *

01-Support

3 files

*Do not click “add folders” to
select and share sub-folders*

[Add folders](#)



2.3.2 “BRIDGE” BIM EXECUTION PLAN TEMPLATE

The BIM Manager must generate the [BIM Execution Plan](#) and make it available to the project team.

1. Go to the [COS-Support](#) project and navigate to:
Docs → Files → Project Files → Shared
2. Inside the *Shared* folder, browse to find *BIMxp.docx* and share it to “another project” as shown on the right.
 - a) Select the destination project.
 - b) Select this folder:
Project Files → Shared → BIMxp
3. Open *BIMxp.docx* and click the *Edit* button in the upper-right corner:and paste the draft BIM Execution Plan into the document.
4. Work with the project manager and engineer to make edits to the BIMxp document and share it with the project team.

Share with

[Learn more](#)

- ☐ 👥 Project members with view-only access or higher
- ☐ 🌐 Anyone with the link
- ☒ 📁 Another project

☐ Automatically sync updates to target project

Only changes to files in the selected parent folders will be updated. This does not include selected files, any subfolders, or files inside subfolders.

Title

Select project * ⓘ

Select folder * ⓘ



2.3.3 “BRIDGE” REMOTE SENSING DATA (OPTIONAL)

There are MrSID images (each image comes with a *.sid*, *.sid.xml*, and *.sid.aux.xml* files), and Lidar point cloud files (in *.las* format) available for projects.

At any time during the project, the BIM Manager (project admin) may “bridge” remote sensing and/or imagery data to their *02-Data* folder to be used by project team members (each sub folder also contains a drawing index for reference – bridge it first to locate image files).

1. Go to the [COS-Support](#) project and navigate to:
Docs → Files → Project Files → 02-Data
2. Inside the *02-Data* folder, browse to the correct files, select them, and share them with “another project” as shown on the right.
 - a) Select the destination project.
 - b) Select this folder:
Project Files → Civil → 02-Data
3. Let the project team know the data files are available to use.

Share with

[Learn more](#)

- ☐ 👥 Project members with view-only access or higher
- ☐ 🌐 Anyone with the link
- ☒ 📁 Another project

☐ Automatically sync updates to target project

Only changes to files in the selected parent folders will be updated. This does not include selected files, any subfolders, or files inside subfolders.

Title

Select project * ⓘ

Select folder * ⓘ



2.3.4 AUTODESK DESKTOP CONNECTOR

The BIM Manager must make sure project team members have the same version of [Autodesk Desktop Connector](#)® (version 16+) and work with Seattle IT to ensure that updates are applied to everyone at the same time.

Autodesk Desktop Connector® must be configured to prevent reference templates from being uploaded to Autodesk Docs when using Autodesk Collaboration for Civil 3D®.

Team members must also utilize the same compatible versions of desktop applications and upgrade at the same time. Seattle IT will notify [BIMxp](#) authors about upcoming software updates so they can coordinate with their project teams.

City of Seattle Project Folder Root

C:\Users\%USERNAME%\DC\ACCDocs\City of Seattle\[project]\Project Files\...

(from this point on, folder paths will be shown after this root folder level)



2.3.5 MEMBER ROLES

Project members have defined roles that are tied to folder permissions:

- BIM Manager: full control of all folders (project administrator)
- Contractor: view/download/upload and create issues/markups in the *Shared* folder
- Drafter: view/download all folders and full control of the *Civil/05-Design* folder and sub-folders
- Engineer: view/download all folders and full control of the *Civil/05-Design/WIP* folder
- IT: full control of all folders (account administrator)
- Project Manager: view/download all folders and create issues/markups within most sub-folders
- Reviewer: view all folders and create issues/markups within most sub-folders
- Surveyor: view/download all folders and full control of *Civil/04-Survey* folder and sub-folders



2.3.6a SUPPORT FILES FOR EXTERNAL PARTNERS (1 OF 2)

Support File Search Path

For external team members to utilize the City of Seattle custom linetypes, each person must sync this folder location (right-click and select “always keep on this device”) in Autodesk Desktop Connector®:

...\Civil\01-Support

Then, in Civil 3D®, run the *Options* command, switch to the “Files” tab, select “Support File Search Path” and click the “Add...” button to add the *01-Support* folder path shown above.

Plot Style Table for Batch Plotting

When batch plotting sheets, team members will need to configure Civil 3D® to access to the CTB stored in the following folder:

...\Civil\01-Support

In Civil 3D®, run the *Options* command, switch to the “Files” tab, expand “Printer Support File Path”, select “Plot Style Table Search Path” and click the “Add...” button to add the *01-Support* folder path shown above.



2.3.6b SUPPORT FILES FOR EXTERNAL PARTNERS (2 OF 2)

Installable Content








Additional support content is available online at <https://www.seattle.gov/tech/bim>

- TrueType Font
- Civil 3D® Pipe and Pressure Network Catalogs
- Civil 3D® add-ins



2.3.7a PROJECT FOLDERS AND FILE REFERENCING (1 OF 2)

The BIM Manager (project admin) must confirm that members are added with proper roles (permissions are inherited from roles) and that the Civil project folders are setup.

<input type="checkbox"/> Name ^	Synced with Bridge
<input type="checkbox"/> 01-Support	
<input type="checkbox"/> 02-Data	
<input type="checkbox"/> 03-PrelimEng	
<input type="checkbox"/> 04-Survey	
<input type="checkbox"/> 05-Design	
<input type="checkbox"/> 06-Record	
<input type="checkbox"/> _Shortcuts	

XREFs and DREFs

Drawings shall be saved in the following locations:

- Authoritative survey drawings:
...\Civil\04-Survey\D-XREF
- Authoritative design drawings:
...\Civil\05-Design

It is permitted to create sub folders if needed during project setup, but the changes must be communicated with the project team. Utilize the *WIP* sub folder for works in progress.

Civil 3D Data Shortcuts

The Autodesk BIM Collaborate Pro® entitlement is required to setup [Civil 3D® data shortcuts](#):

1. Run the *SetWorkingFolder* command and set it to the "Project Files" folder level.
2. Run the *SetShortcutsFolder* command, select the "Civil" folder and click OK.



2.3.7b PROJECT FOLDERS AND FILE REFERENCING (2 OF 2)

Authoritative 2D and 3D Drawings

Authoritative drawings must only contain objects related to the drawing discipline with no extraneous content and all other drawings must be saved in the *WIP* sub folder ([learn more](#)).

The BIM Manager must document the list of authoritative drawings in the [Model Progression Matrix](#) in the BIMxp.

Authoritative drawings must follow the [file naming convention](#) according to the type of content contained within them:

- 2D drawings (such as roadway hatch patterns) must only contain 2D linework and annotation that will be shown on a sheet and printed.
- 3D drawings (such as sewer or storm pipe networks) must only contain 3D models and labels that will be shown on a sheet, referenced into another drawing, or published to an external system (such as GIS).

Composite Drawings

To increase efficiencies by reducing the number of data shortcuts in sheets, add data references into a single drawing for standard stylization and labeling in this location:

...\Civil\05-Design\B-Comp

Example composite utility file name:

[PTN]_3D-UTIL-Composite.dwg

Example composite grading file name:

[PTN]_3D-GRAD-Composite.dwg

These composite drawings may be referenced into sheets (use the XCLIP command to trim them down, if necessary).



2.3.8 CURATING PROJECT DATA

Ortho Imagery

The BIM Manager can [make ortho imagery \(MrSID files\) available](#) in this location:

...\Civil\02-Data

Overlay the ortho index drawing to locate the images in your area of interest. Then use the *Mapiinsert* command to insert the image(s).

The BIM Manager may also export GeoTIFF ortho imagery from [EagleView](#) into the *02-Data* folder.

Lidar Data

The BIM Manager can [make Lidar data \(ReCap files\) available](#) in this location:

...\Civil\02-Data

Overlay the Lidar index drawing to locate the point clouds in your area of interest. Then use the *PointCloudAttach* command to connect to the point cloud(s).

GIS Data

Use [Autodesk Connector for ArcGIS®](#) to connect to data from Open Data sites, such as:

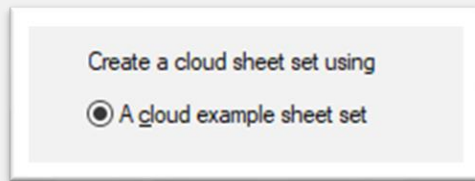
- [City of Seattle](#)
- [King County](#)

([Common Data Layers](#) are also available internally)

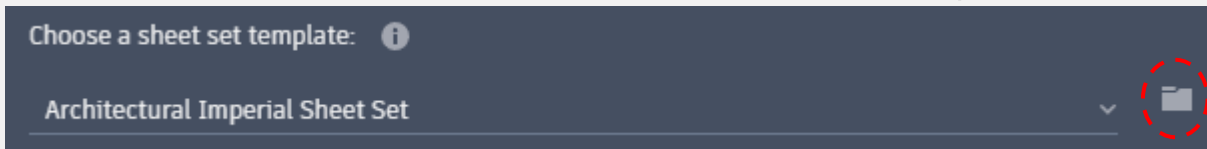


2.3.9a SPU/SDOT SHEET SET SETUP (1 OF 2)

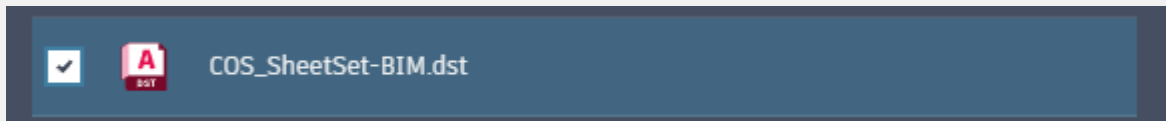
In Civil 3D®, run the *NewSheetSet* command and create a cloud sheet set using “a cloud example sheet set” and click the Next button.



Fill out the name of the new sheet set (matches the project name with the PTN prefix), add a description, and click the folder icon to choose a sheet set template:



Browse to the *01-Support* folder for your project, check the box next to *COS_SheetSet-BIM.dst* file, and click the Select button.



Click the folder icon to choose the sheet set data file (.dst) storage location:



Go to the project and browse to:

Project Files → Civil → 05-Design

Check the box next to the *A-Sheet* folder and click the Select button.



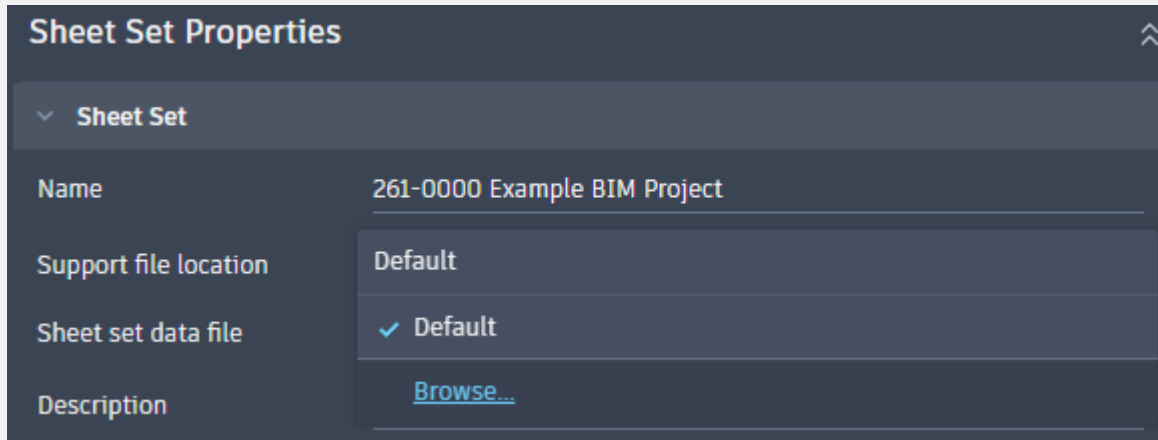
Once this is done, click the Next button to review the Sheet Set Details and then click the Create button.



2.3.9b SPU/SDOT SHEET SET SETUP (2 OF 2)

After the Sheet Set has been created, in the Sheet Set Properties, click in the “support file location” field and select the [Browse...](#) link.

Once this is done, Sheet Set Manager can be used to create and manage sheets.



Sheet Set Properties

Sheet Set

Name: 261-0000 Example BIM Project

Support file location: Default

Sheet set data file: ✓ Default

Description: [Browse...](#)

Go to the project and browse to:

Project Files → Civil

Click the check box next to the *01-Support* folder and click the Select button.



☒ 01-Support



City of Seattle

BIM Standards

SECTION 3: Project Templates and Dependencies

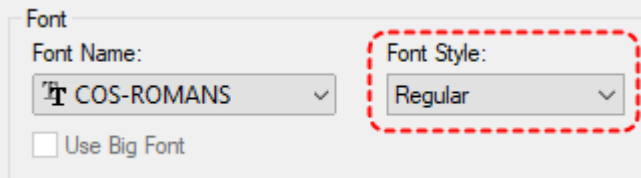


3.0 TRUETYPE FONT

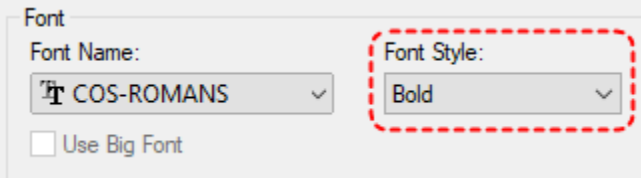
Sheets and drawings must utilize COS-ROMANS.TTF, a TrueType Font designed to mimic ROMANS.SHX. External partners must [download this font](#) and install it.

There are two styles with this font:

- **Regular:** a thin lineweight used for screened-back annotation (such as base maps).

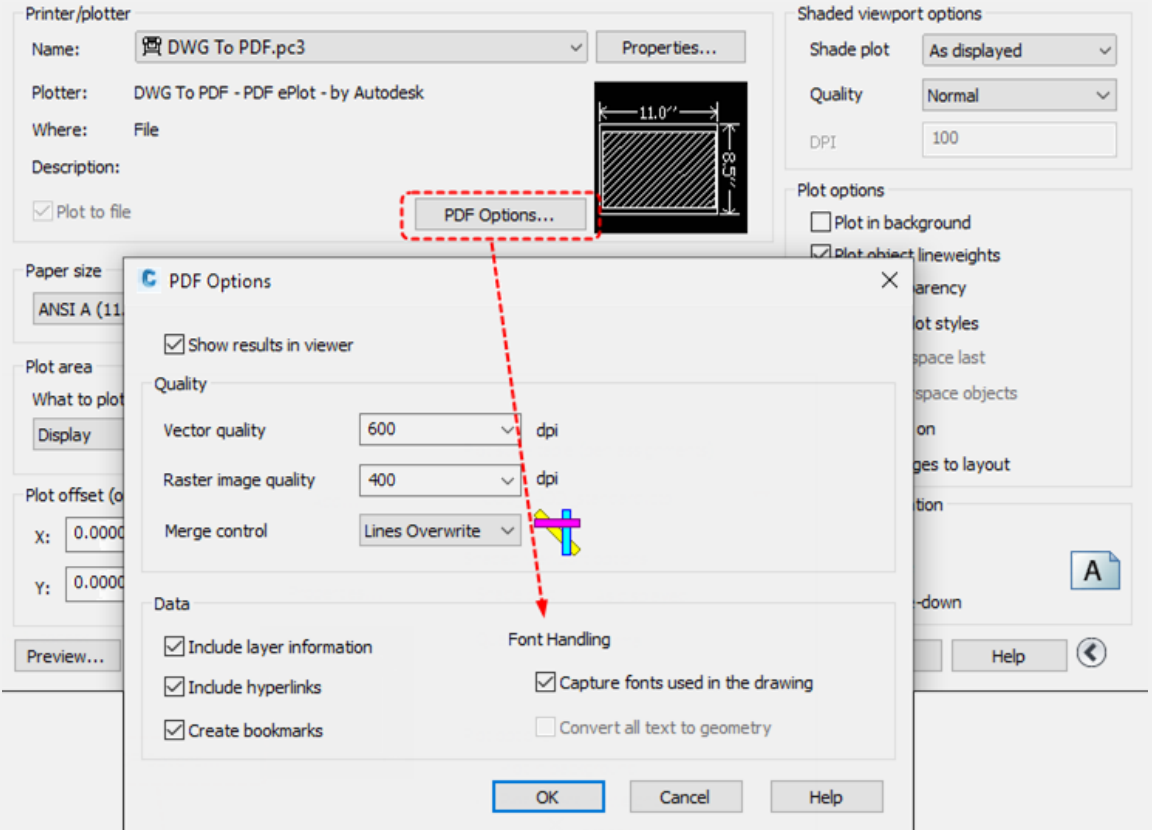


- **Bold:** a thick lineweight for standard annotation.



Using a TrueType font makes PDF files searchable and lightweight, so they open efficiently.

Plot using **DWG to PDF.pc3** to capture the COS-ROMANS.TTF font and embed it in the PDF so the font will be displayed for anyone who views the PDF, even if they don't have COS-ROMANS.TTF installed.





3.1 COLOR TABLES

When drawings that are plotted to PDF, DWFx, or hard copy, color tables (.CTB files) are used to control the plotted lineweights and colors. Because the City of Seattle uses a TrueType Font, all annotation is unaffected by the color table lineweight settings.

Primary SPU/SDOT Color Table

[COS_CADD_standard.ctb](#) (specific colors are plotted in color to meet APWA standards)

Secondary SPU/SDOT Color Tables

COS_CADD_Fine-Color.ctb (plotting in color with a fine lineweight)

COS_CADD_Fine-Mono.ctb (plotting in black and white with a fine lineweight)



3.1.1 SPU/SDOT COLOR TABLE

COS_CADD_standard.ctb							
Lineweight	Plotted Color (APWA use)		Color #: 100% screening	Color #: 80% screening	Color #: 65% screening	Color #: 60% screening	Color #: 55% screening
0.003	• BLACK		105, 125				
0.003	• 200	(IRRG)	140				
0.005	• BLACK		63, 193, 233				
0.007	• BLACK		22, 65, 186	252	253		254
0.01	• BLACK		14, 85, 206				
0.012	• BLACK		1, 226				
0.014	• BLACK		7, 130, 246				
0.02	• BLACK		2, 21				145
0.02	• 40	(COMM/SIGL)	42				
0.024	• BLACK		3, 41, 165				
0.024	• RED	(ELEC/POWR)	240				
0.028	• BLACK		4, 61				185
0.031	• BLACK		6, 81			205	
0.031	• GREEN	(SSWR/STRM/CSWR)	84, 85, 94, 95, 114, 115				
0.031	• BLUE	(WATR)	163, 164, 165				
0.039	• BLACK		5				
0.0417	• YELLOW	(NGAS)	52, 53				
0.047	• BLACK		12, 121, 245				
0.07	• BLACK		53				



3.2 CIVIL MODEL TEMPLATES AND LAYERS

Civil 3D® Templates

Project team members must have access to the drawing template (.DWT) files and the following dependencies located in the *01-Support* folder:

- Reference Templates
- COS-ROMANS.TTF (download and install locally)
- Standard Color Table (.CTB) file
- Pipe Network Catalog
- Pressure Network Catalog
- Linetype (.LIN) file
- Hatch pattern file (out-of-the-box)
- Quantity Takeoff files: QTOManager
 - APWA bid item (.CSV) file
 - Formula (.FOR) file
 - Category (.XML) file

Standard Layers

The layer name format is organized as a hierarchy. This arrangement allows users to select from several options for naming layers according to the level of detailed information desired. Layer names consist of distinct data fields separated from one another by dashes. A detailed list of abbreviations, or field codes, is prescribed to define the content of layers. Most field codes are mnemonic English abbreviations of construction terminology that are easy to remember.

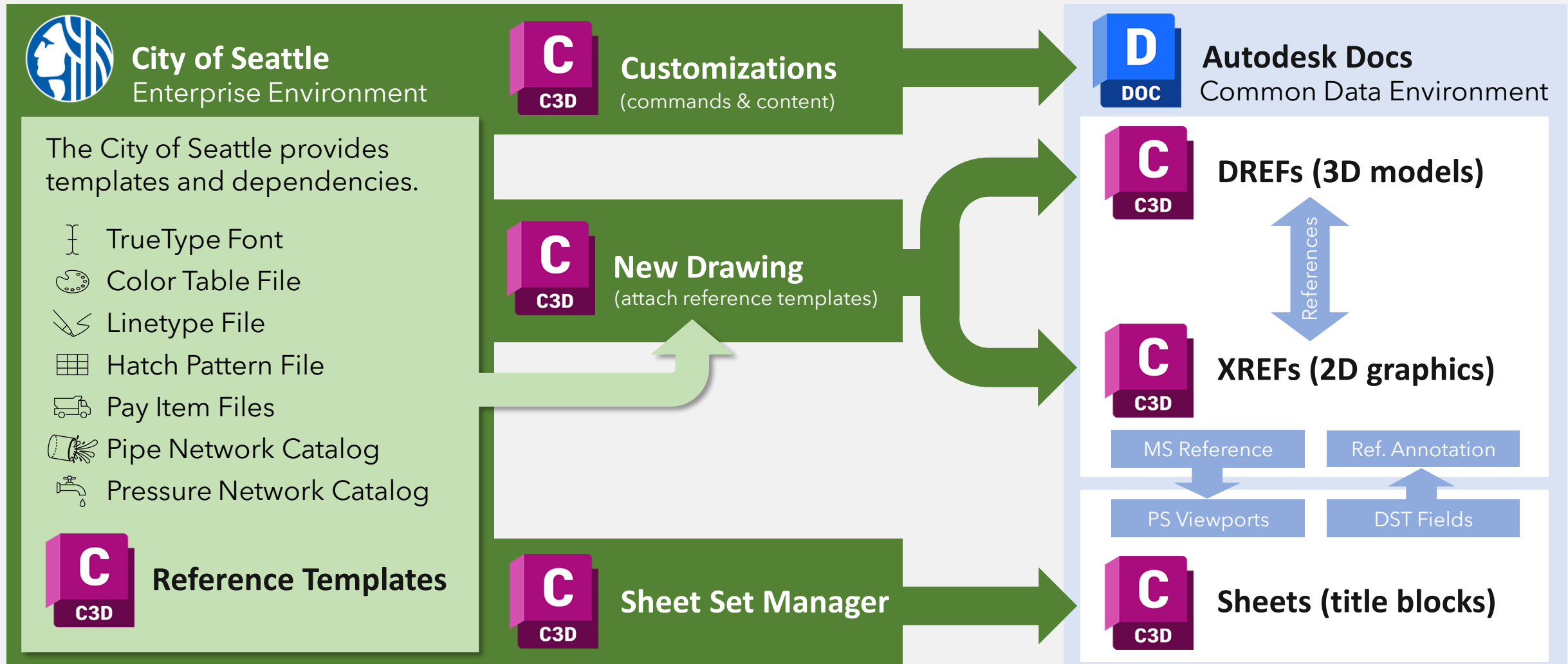
The layer name format, showing the Discipline Designator, the Major Group, two Minor Groups (optional), and the Status (optional) fields looks like this:



For a list of standard layers, see [layer standards database](#)



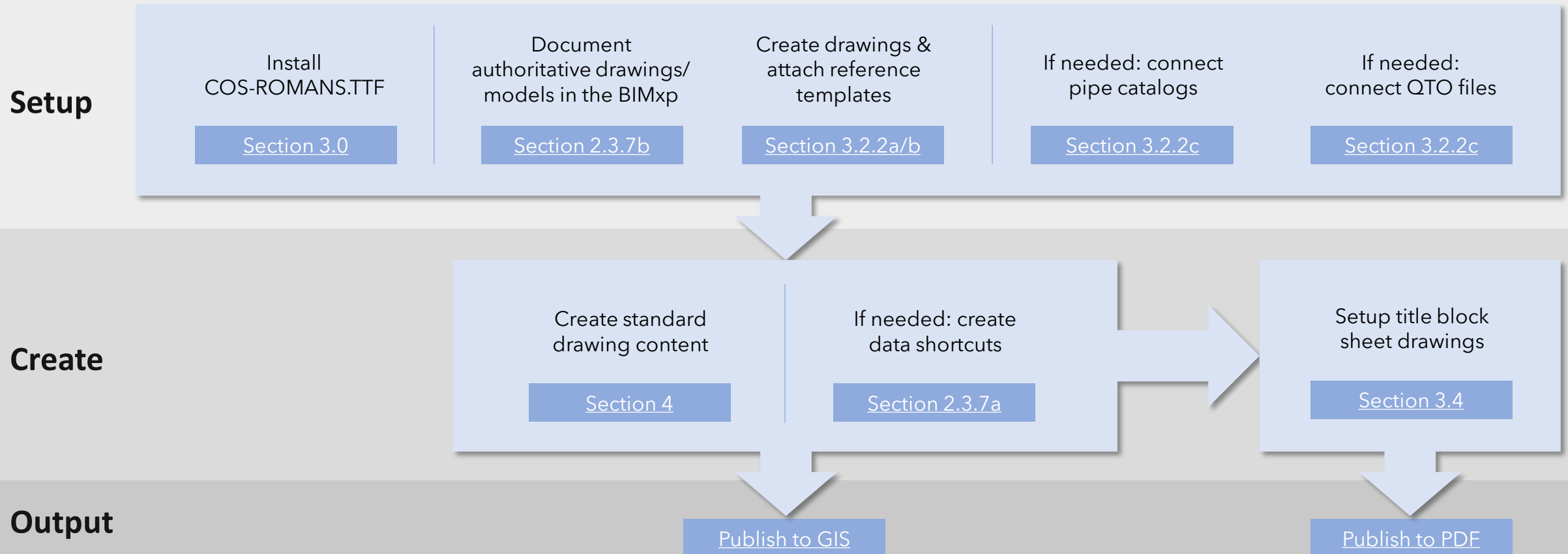
3.2.1a CIVIL TEMPLATES AND DEPENDENCIES (1 OF 2)





3.2.1b CIVIL TEMPLATES AND DEPENDENCIES (2 OF 2)

Once the BIM Manager has setup the project environment, follow these steps to create authoritative civil drawings and data shortcuts per [Sections 2.3.6a/b](#):





3.2.2a SETTING UP CIVIL TEMPLATE DEPENDENCIES (1 OF 3)

New Drawings

Create new drawings and save with [standard file names](#):

- New survey drawings:
...\Civil\01-Support\COS-SV-Blank.dwt
- New design drawings:
...\Civil\01-Support\COS-New-DD.dwt

Reference Templates

Start a new drawing with a blank template in Civil 3D® and run the *AttachReferenceTemplate* command to attach the required reference templates from this location:

...\Civil\01-Support

Reference templates have a hierarchy, and a template takes precedence over the templates below it.

See next page for list of available reference templates.



3.2.2b SETTING UP CIVIL TEMPLATE DEPENDENCIES (2 OF 3)

Available Land Survey Reference Template

- Master survey template:
COS-SV-Master.dwt

Available Design Drafting Reference Templates

- General design drawing reference template
(**must be above other reference templates**):
COS-DD-Ref-00-General.dwg
- Grading:
COS-DD-Ref-CG-GRAD.dwg
- Channelization:
COS-DD-Ref-CP-CHAN.dwg
- Curb/ADA:
COS-DD-Ref-CP-CURB.dwg
- Roadway:
COS-DD-Ref-CP-ROAD.dwg
- Electrical Site:
COS-DD-Ref-CS-ELEC.dwg
- Lighting Site:
COS-DD-Ref-CS-LITE.dwg
- Signalization Site:
COS-DD-Ref-CT-SIGL.dwg
- Signage Site:
COS-DD-Ref-CT-SIGN.dwg
- Drainage & Wastewater System:
COS-DD-Ref-CU-DWW.dwg
- Water System:
COS-DD-Ref-CU-WATR.dwg
- Irrigation System:
COS-DD-Ref-LI-IRRG.dwg
- Tree Planting:
COS-DD-Ref-LP-TREE.dwg



3.2.2c SETTING UP CIVIL TEMPLATE DEPENDENCIES (3 OF 3)

Pipe Network Catalog

Run the *SetNetworkCatalog* command and set the catalog folder path to:

Set path to [Pipe Network Catalog](#) provided by City of Seattle (internal catalog path: W:\CIVIL3D\Pipes\Gravity).

Pipe Catalog: US Imperial Pipe Catalog

Structure Catalog: US Imperial Structure Catalog

Pressure Network Catalog

Run the *SetPressureNetworkCatalog* command and set the catalog folder path to:

Set path to [Pressure Network Catalog](#) provided by City of Seattle (internal catalog path: W:\CIVIL3D\Pipes\Pressure).

Choose the catalog SQLite database file that is required for your work.

Quantity Takeoff Files

Sync this folder location in Autodesk Desktop Connector®:

...\Civil\01-Support

Run the *QTOManager* command in Civil 3D® to load:

- Pay Item file: QTO_PayItems2017.csv
- Pay Item Category file: QTO_PayItemCategories.xml
- Pay Item Formula file: QTO_PayItemFormulas.for



3.3 FACILITY MODEL TEMPLATES AND LAYERS

AutoCAD Plant 3D® Templates

Learn how to get up and running with [Autodesk Collaboration for AutoCAD Plant 3D®](#).

Standard AutoCAD Plant 3D® Layers

The City of Seattle uses out-of-the-box AutoCAD Plant 3D® layers, but when plotting, be sure to utilize standard layer colors to ensure lines have the correct lineweights.

Example colors:

Color 6 plots bold, color 2 plots medium weight, color 1 plots thin, and color 7 is used for proposed [annotation](#).

Export AutoCAD Plant 3D® Layouts to Civil 3D®

Sheets are managed by Civil 3D®, thus all AutoCAD Plant 3D® sheet views must be exported to Civil 3D® sheet layouts. Set a layout current and run the *ExportLayout* command and save this drawing in this location:

...\Civil\05-Design

This drawing may be referenced into model space of

a Civil 3D® sheet and the content displayed in paper space via viewports.

Revit® Templates

The City of Seattle does not have Revit® templates available currently.

Project sheets are managed by Civil 3D®, thus if Revit® is used for a project, all Revit® sheet views must be coordinated with Civil 3D® sheet sets and have the same look and feel.

[COS-ROMANS.TTF](#) must be used for annotation.



3.3.1 FACILITY MODEL SETUP

Setup the facility models in a sub-folder directly under this location:

C:\Users\%USERNAME%\DC\ACCDocs\City of Seattle\[project]\Project Files\

Work with the project team to define the Project Asset List (PAL) requirements in the [BIMxp](#).



3.3.2 FACILITY MODEL COORDINATION PRISM

The *coordination prism* is a generic model object that contains enough information to substitute for a model, is located at a defined (relative) working point in the project and is assigned geo-located coordinates, elevation, and angle heading. This is a geometric wedge with linework on the bottom and placed at the same coordinates in all working drawings (including civil drawings). This helps to confirm that drawings are aligned and eliminates any concerns of “something has moved” regarding the XREF. Having a simple object that is identical in all models allows for quick visual checks on alignment rather than reviewing the data for several points.

The project team must decide what the coordination prism will look like and where it will be placed each model. Civil 3D® must be used to assign the X, Y, and Z coordinates and true north rotation. The coordination prism information must be documented in the BIMxp.

Coordinates in Facility Models

To display project coordinates in a facility model, follow the instructions below:

- [Plant 3D®: isometric location and offset rotation...](#)
- [Revit®: link a civil drawing file and acquire its coordinates...](#)



3.4 SHEET (TITLE BLOCK) TEMPLATES

Sheet Set Manager (SSM)

Seattle Public Utilities (SPU) and Seattle Department of Transportation (SDOT) use Sheet Set Manager to create and manage sheets.

The project team must only make edits to the Sheet Set DST with Autodesk 2023 (or newer) desktop applications.

Sheets and all drawings that are externally referenced into them must utilize [COS-ROMANS.TTF](#). Use of SHX fonts is prohibited.

To open your project's Sheet Set, run the *OpenSheetSet* command and navigate here to find your project DST file:

...\Civil\05-Design\A-Sheet

Attributed Title Blocks

Seattle Parks and Recreation (SPR) and Seattle City Light (SCL) use attributed title block templates to create and manage sheets.



3.4.1a SDOT/SPU SHEET STANDARDS (1 OF 11)

The SDOT/SPU title block is contained within a template that was specifically designed to be used within Sheet Set Manager (SSM). Various SSM fields are editable within the "Sheet Set Custom Properties" (all sheets) and "Sheet Custom Properties" (individual sheet).

Drawing Numbers

SHEET TITLE	
PROJECT TITLE	PC CO
	VPI # → G-001
	SHEET 1 OF 10

Drawing number format (take note of number of characters):

- **Two-character** discipline designator (use a dash for second character, if needed).
- **Single-digit** sheet type code.
- **Two-digit** sequence number (restarts at 01 for every sheet type).

Example Drawing Numbers:

Seventh Civil Plan/Profile: **C-107**

Second Civil Paving Plan/Profile: **CP102**

Drawing Number Breakdown:

Discipline: **CP**102

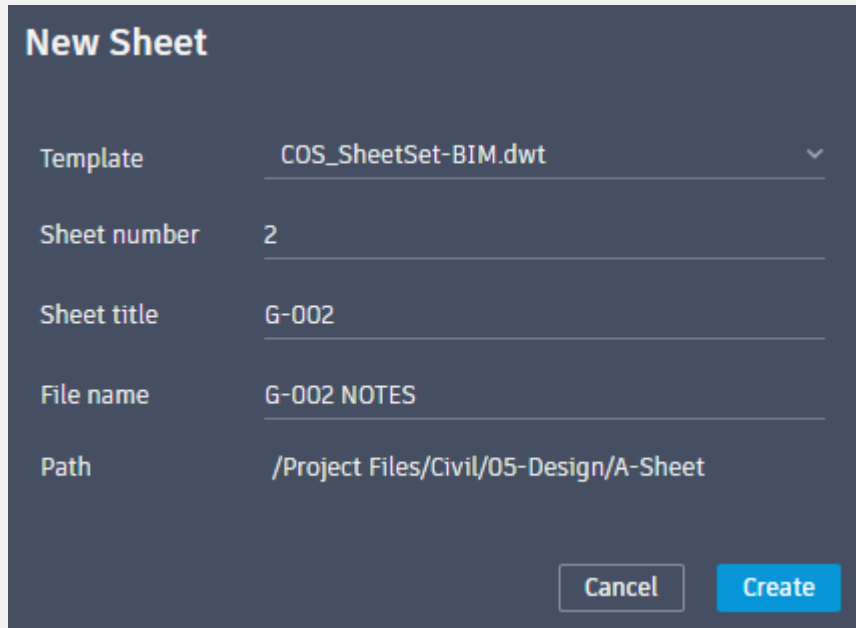
Sheet Type: CP**1**02

Sequence #: CP1**02**

3.4.1c SDOT/SPU SHEET STANDARDS (3 OF 11)

When creating sheets in Sheet Set Manager, it will prompt the user to enter:

- Sheet Number: the absolute sheet number.
- Sheet Title: the [drawing number](#) (discipline).
- File Name: the sheet drawing file name.



New Sheet

Template: COS_SheetSet-BIM.dwt

Sheet number: 2

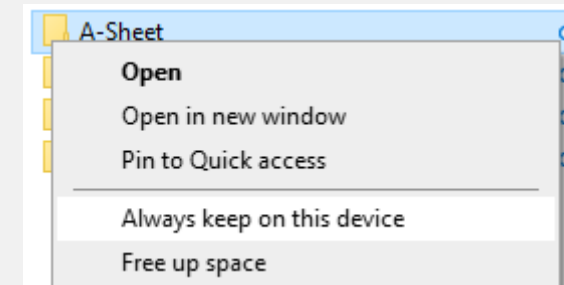
Sheet title: G-002

File name: G-002 NOTES

Path: /Project Files/Civil/05-Design/A-Sheet

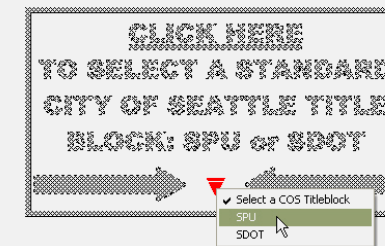
Buttons: Cancel, Create

Once the sheet has been created, in Windows File Explorer navigate to the *A-Sheet* folder, right-click, and select "always keep on this device".



This will allow the user to open the drawing to make edits.

The title block is dynamic so when the user creates a new sheet, they can choose which logo appears in it:





3.4.1d SDOT/SPU SHEET STANDARDS (4 OF 11)

Click on the Sheet Set heading to view the Custom Sheet Set Properties:

Click on a sheet to edit the description:

Sheet Set Properties

Custom Sheet Set Properties

Federal Aid Project No

%%

Job Number - CO

%%

Job Number - PC

%%

Misc

%%

Ordinance Number

%%

Permit Numbers

%%

Project Title

Project Title

PW Number

%%

Total Number of Sheets

?

Vault Plan Number

%%

Vault Serial Number

%%

Sheet Properties

Sheet

Sheet title

G-002

Sheet number

2

Description

NOTES

The description will appear as the sheet title in the drawing.

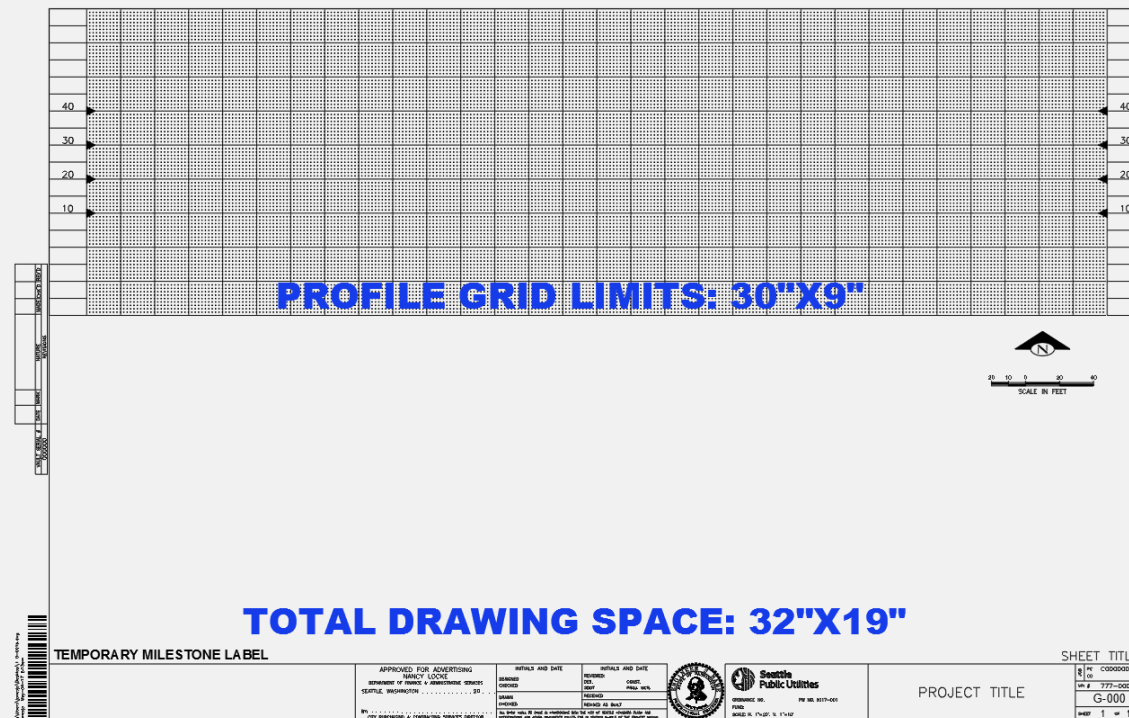
Blank Fields

To clear the contents of a field, enter: %%

3.4.1e SDOT/SPU SHEET STANDARDS (5 OF 11)

It is important to plan design views to fit inside the SPU/SDOT title block. The total drawing space within the title block is 32"x19". The profile grid takes up 30"x9".

When planning for drawing views, leave about ½ inch space on every side that has a match line and about 1 inch of space under profile views for station labels. Also, if a legend or notes will appear on the sheet, leave about 5 or 6 inches on the right-hand side.





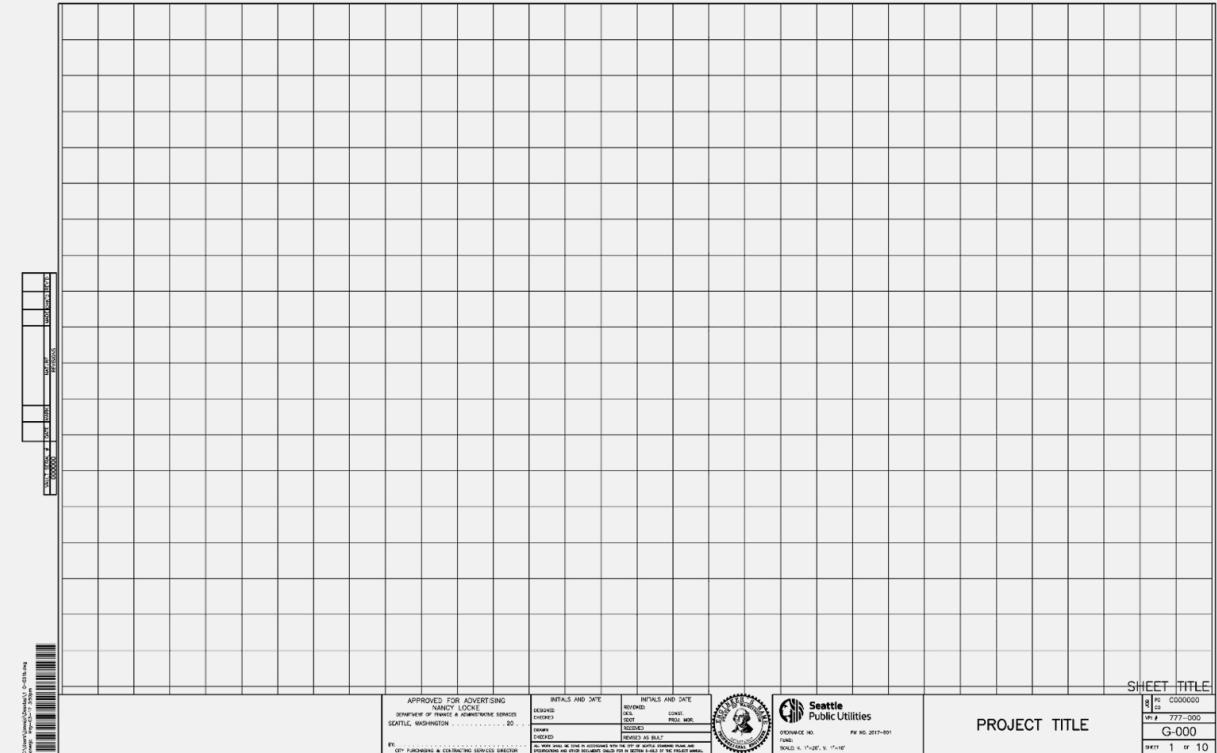
3.4.1f SDOT/SPU SHEET STANDARDS (6 OF 11)

The title block image shown on the right is a planning tool to estimate the approximate number of sheets required for a project.


The scales shown below the title block represent common viewport scales.

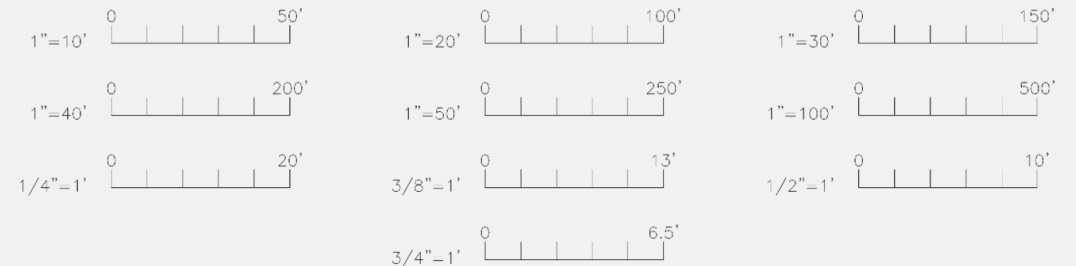
This tool allows the user to plan drawing views using common engineering and architectural scales. The drawing area in the image reflects useable drawing area of the title block. Inside the drawing area is a grid which contains representations of 1"x1" squares.

A graphic component 100 ft. x 40 ft. drawn at a 1"=20' scale would be approximated by counting five squares over and two squares down.



The title block at the bottom of the grid contains the following information:

APPROVED FOR ADVERTISING: SUPERVISOR OF PERMIT & RIGHT-OF-WAY SERVICES SEATTLE, WASHINGTON		INITIALS AND DATE DESIGNED: [] [] [] [] CHECKED: [] [] [] [] DATE: [] [] [] []		INITIALS AND DATE REVIEWED: [] [] [] [] DATE: [] [] [] []		 Seattle Public Utilities PERMIT NO. 777-200 SHEET NO. G-000 SHEET 1 OF 10	
PROJECT TITLE						SHEET TITLE	





3.4.1g SDOT/SPU SHEET STANDARDS (7 OF 11)

It is crucial to create named views (command: VIEW) in XREF drawings (model space) for planning purposes. View names must reflect the exact title of the drawing view, detail or section.

For example, an “air valve vault detail” view must be named, AIR VALVE VAULT DETAIL.

The AutoCAD® view manager, however, will not allow certain “special characters” in named views (such as <>^"':;?*|,=`) but there is a workaround. Here are %% codes to use in place of these special characters:

%%60 = <	%%39 = '	%%44 = ,
%%62 = >	%%34 = "	%%63 = ?
%%47 = /	%%58 = :	%%42 = *
%%92 = \	%%59 = ;	%%61 = =



3.4.1h SDOT/SPU SHEET STANDARDS (8 OF 11)

The sheet index must contain the sheet number (SHT NO = Sheet Number field), drawing number (DWG NO = Sheet Title field), and description (DESCRIPTION = Sheet Description field). Field names are illustrated in red below:

SHEET INDEX		
Sheet Number ↓	Sheet Title ↓	Sheet Description ↓
SHT NO	DWG NO	DESCRIPTION
1	G-001	VICINITY & LOCATION MAPS, DETAIL & SECTION REFERENCING, AND SHEET INDEX

To create a sheet index, do the following steps:

- Sync the DST file in Desktop Connector.
- Open the sheet that is to contain the sheet index and create a *Table* as illustrated above with the SHT NO, DWG NO, and DESCRIPTION headings.
- In each cell, type text or insert a field (right-click and select “Insert Field...” or use CTRL+F) that references the following data in the [standard order](#):
 - SHT NO: “sheet number” field for the sheet
 - DWG NO: “sheet title” field for the sheet
 - DESCRIPTION: “description” field for the sheet

3.4.1i SDOT/SPU SHEET STANDARDS (9 OF 11)

Sheets must be grouped by [discipline code](#) in the order of the list shown here:

- G: Cover Sheet
- G: Sheet Index (place on cover sheet if less than 55 lines)
- G: Notes
- V: Survey Control Plan (including datum info)
- V: Right-of-Way Plan (if needed)
- B: Geotechnical Plans
- C: Site Preparation Plans
- C: CSEC Plans
- C: Demolition/Removal/Protection Plans
(may be combined with CSEC, site, and/or other discipline plans)
- C: Water Plans and Profiles
- C: Water Details
- C: Drainage/Wastewater Plans and Profiles
- C: Drainage/Wastewater Details
- C: Street Lighting and Signal Plans
- C: Street Lighting and Signal Details and Diagrams
- C: Power Plans
- C: Power Details and Diagrams
- C: Communications Plans
- C: Communications Details and Diagrams
- C: Paving/Roadway Grading Plans and Profiles
- C: Paving/Roadway Grading Sections and Details
- C: Intersection Plans
- C: Channelization/Signage Plans
- L: Landscaping/Irrigation Plans
- L: Landscaping Details and Schedules
- S: Structural Plans, Details and Sections
- A: Architectural Plans, Elevations, Details and Sections
- M: Mechanical
- E: Electrical Details and Diagrams
- D: P&ID
- X: I&C
- X: Other



3.4.1j SDOT/SPU SHEET STANDARDS (10 OF 11)

Details must be labeled with a title, scale centered under the title, reference numbers in a bubble callout to the right of the title and a North arrow.

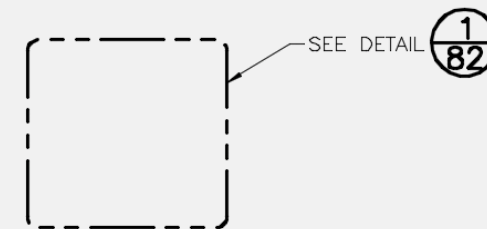
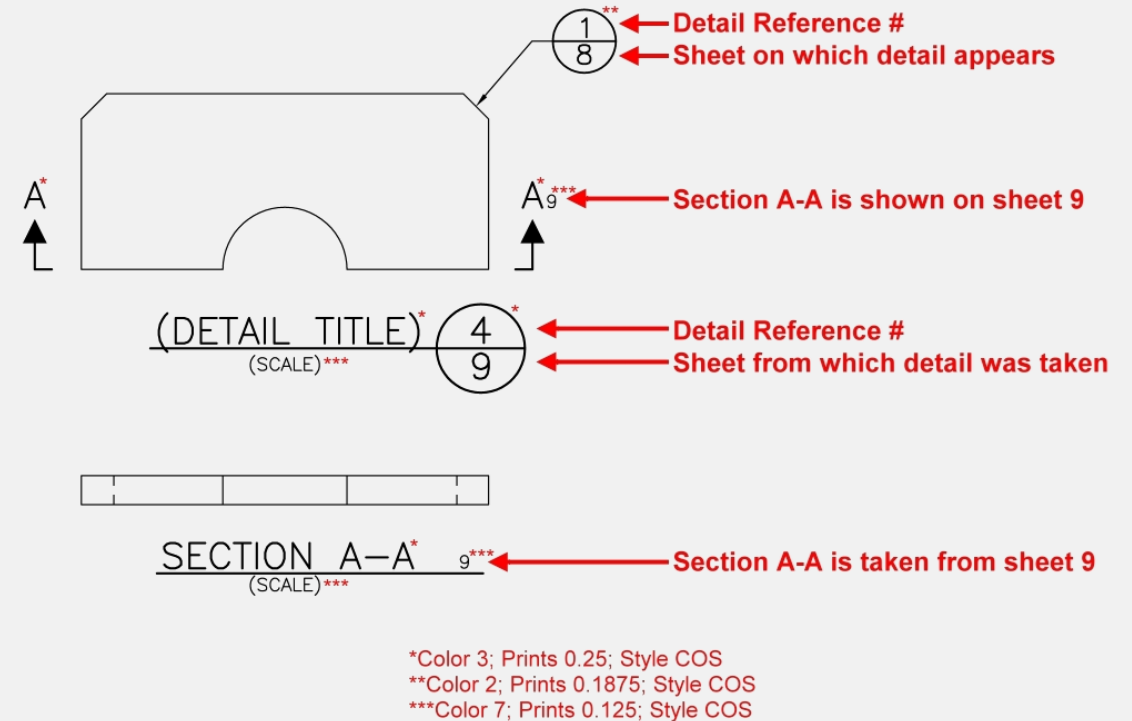
Sections must be labeled with a letter designation in this format: SECTION X-X # (sheet reference is shown to the right of the title) and scale centered underneath.

Detail and section viewports must be numbered/lettered via the Sheet Set Manager "Sheet Views" tab and arranged in order to be read from left-to-right/top-to-bottom.

There are two types of sections: "civil sections" and "detail sections". Civil sections relate to a plan view and are typically dimensioned in an engineering format while detail sections relate to a detail view and are dimensioned in an architectural format.

Reference Boxes

Use layer []-DETL-ANNO-REFR (color yellow, linetype PHANTOM2) to create a box that references to another detail or sheet.



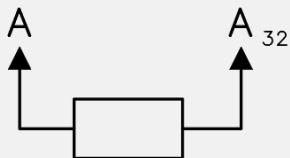
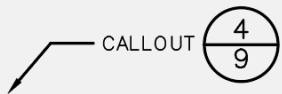
3.4.1k SDOT/SPU SHEET STANDARDS (11 OF 11)

AutoCAD® Fields can be inserted for Sheet Set Manager view numbers and sheet numbers in Text, MTEXT, Dimensions, Multileaders and block attributes. To do this, sync the DST file in Desktop Connector, use the CTRL+F keyboard shortcut or right-click and select "Insert Field..." when in any AutoCAD® text editor, and select the "SheetSet" field name.

Insert SSM blocks from here: ...\\Civil\\01-Support



SECTION A-A 30



MATCH LINE STA XX+XX – SEE SHEET 5

DETAIL TITLES: Use either *SSM-view_label_standard-DB.dwg*, *SSM-view_label_broken-DB.dwg*, or *SSM-view_label_multiline-DB.dwg* for detail titles. These blocks may be placed under the detail views in paper space. These blocks must refer to the sheet the detail was taken from. To do this, double-click on the sheet number to edit the attribute and then double-click on the sheet number value to assign the correct sheet.

SECTION TITLES: Use *SSM-section_view_label.dwg* for section titles. This block may be placed under the section views in paper space and it must refer to the sheet the section was taken from.

DETAIL REFERENCE CALLOUTS: Use either *SSM-callout.dwg* or *SSM-callout_broken.dwg* next to annotation (such as a multileader, as shown here) to refer to a detail's number and the sheet number where it is displayed.

SECTION REFERENCE CALLOUTS: Use *SSM-section_arrows-DB.dwg* to indicate where a section is cut and to refer to the section's letters and the sheet number where it is displayed.

MATCH LINES: Use the following match line blocks in paper space: *SSM-match_line-L.dwg* (left match lines; may also be used for top match lines) or *SSM-match_line-R.dwg* (right match lines; may also be used for bottom match lines).



City of Seattle

BIM Standards

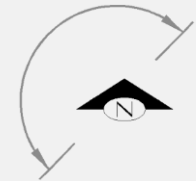
SECTION 4: Drawing Standards



4.0 DRAWING STANDARDS

Every drawing must be in the world UCS with the 0,0 point defined by Survey in the Survey drawing. It is important to utilize the standard coordinate system in order to allow information from different design disciplines to be displayed together and be published to GIS. Each design drawing must be in model space (no design elements in paper space). Have the base and other design drawings externally referenced during editing sessions, and when finished, detach all XREFs.

- North arrows must be oriented up, to the left or aligned within the area shown on the right.
- Do not draw on layers 0 (zero) or Defpoints because they cannot be manipulated in an XREF.
- Create the design in model space at 1 drawing unit = 1 ft.
- The XREF type must always be "overlay" and the XREF path type must always be "relative path".
- Draft at Z = 0, design at Z = true elevation, on the correct horizontal and vertical datums.
- Use standard COS layers, colors and linetypes; see [layer standards database](#).
- Abbreviations must be shown in accordance with [Standard Plan No. 002](#).
- Features must be drawn in accordance with [Standard Plan No. 003](#).
- Lettering must not be shown to identify features for which standard symbols are used, unless lettering is shown in the standard symbols.
- Linetype variables LTSCALE, PSLTSCALE, MSLTSCALE & CELTSCALE must always be set to 1.





4.0.1 a CIVIL INFORMATION MODEL DRAWING STANDARDS (1 OF 3)

Authoritative Drawings

It is important to designate drawings as authoritative, which means drawings that are used for data referencing and for printing on sheets. Unless otherwise noted in the BIMxp, authoritative drawings must reside in this location:

...\Civil\05-Design

Before creating authoritative XREF drawings, create a "Civil Plan Views" drawing (name of drawing file: [PTN]_X-VIEW.dwg) and in model space add overlapping rectangles (for civil drawings put the rectangles on layer C-VIEW-FRME) representing the limits of sheet viewports with match lines inside the overlap areas. These rectangles are scaled by the planned viewport scale factor (for example, a 5"x2" rectangle in paper space equals 100'x40' in model space at 1"=20'). Then create a named view for each rectangle. To do this, align the UCS (command: UCS) with the rectangle so the Y direction is aligned along the narrow edge of the rectangle, orient the drawing space to align with the UCS (command: PLAN; use "current" option) and create a named view (command: VIEW) that matches the limits of the box. Repeat this for every rectangle. When finished, set the UCS back to World and copy and rename the drawing file as a starting point to create every other authoritative plan XREF.

Work in Progress (WIP) Drawings

Working drawings may be created but must be saved separate from the authoritative drawings. Unless otherwise noted in the BIMxp, working drawings must reside in this location:

...\Civil\05-Design\WIP



4.0.1b CIVIL INFORMATION MODEL DRAWING STANDARDS (2 OF 3)

Here is the standard file-naming convention for authoritative drawings (common examples shown below):

[PTN]_[**"2D" or "3D"**]-[major layer discipline code]-[optional_description]

BASE	Survey:	[PTN]_3D-TOPO-[optional_description].dwg	SURFACES	Pond:	[PTN]_3D-POND-[optional_description].dwg
	Right-of-Way:	[PTN]_2D-RWAY-[optional_description].dwg		Grading:	[PTN]_3D-GRAD-[optional_description].dwg
	Base Map:	[PTN]_3D-BASE-[optional_description].dwg		Paving:	[PTN]_2D-PVMT-[optional_description].dwg
SITE	Site Preparation:	[PTN]_2D-SITE-[optional_description].dwg	TRANSPORTATION	Roadways:	[PTN]_2D-ROAD-[optional_description].dwg
	CSEC:	[PTN]_2D-EROS-[optional_description].dwg		ADA Ramps:	[PTN]_2D-RAMP-[optional_description].dwg
	Removal:	[PTN]_2D-DEMO-[optional_description].dwg		Channelization:	[PTN]_2D-MRKG-[optional_description].dwg
UTILITIES	Protection:	[PTN]_2D-PROT-[optional_description].dwg		Traffic Signals:	[PTN]_2D-SIGL-[optional_description].dwg
	Water:	[PTN]_3D-WATR-[optional_description].dwg		Lighting:	[PTN]_2D-LITE-[optional_description].dwg
	Drainage:	[PTN]_3D-STRM-[optional_description].dwg	OTHER	Power/Electrical:	[PTN]_2D-POWR-[optional_description].dwg
FACILITIES	Sewer:	[PTN]_3D-SSWR-[optional_description].dwg		River and Creek:	[PTN]_3D-RIVR-[optional_description].dwg
	Combined Sewer:	[PTN]_3D-CSWR-[optional_description].dwg		Landscaping:	[PTN]_2D-VEGE-[optional_description].dwg
	Architectural:	[PTN]_3D-ARCH-[optional_description].dwg		Irrigation:	[PTN]_3D-IRRG-[optional_description].dwg
	Structural:	[PTN]_3D-STRU-[optional_description].dwg		Details:	[PTN]_2D-DETL-[optional_description].dwg
	Mechanical:	[PTN]_3D-MECH-[optional_description].dwg		Miscellaneous:	[PTN]_2D-MISC-[optional_description].dwg



4.0.2a CIVIL INFORMATION MODEL OBJECT STANDARDS (1 OF 2)

Civil 3D® Object Naming Convention

It is important to add understandable names and descriptions to Civil 3D® objects. Some object types may be “data referenced” into other drawings so it is important to use layer-control to ensure duplicate objects are not visible when XREFs are overlaid in sheet drawings. Use this format:

[major layer discipline code]-[optional location]-[optional description]

Example for Pipe Network Names

Sanitary Sewer: SSWR-[optional location]-[optional description]

Storm: STRM-[optional location]-[optional description]

Combined Sewer: CSWR-[optional location]-[optional description]

Example for Pressure Network Names

Water: WATR-[optional location]-[optional description]

Gas: NGAS-[optional location]-[optional description]

4.0.2b CIVIL INFORMATION MODEL OBJECT STANDARDS (2 OF 2)

Custom Civil 3D® Object Properties

Select a Civil 3D® object, run the *Properties* command, and go to the “Extended Data” tab to enter custom data.

SUE Quality Levels

Set the quality level by selecting the *QL* dropdown.

QL-A: direct physical observation recorded by survey.

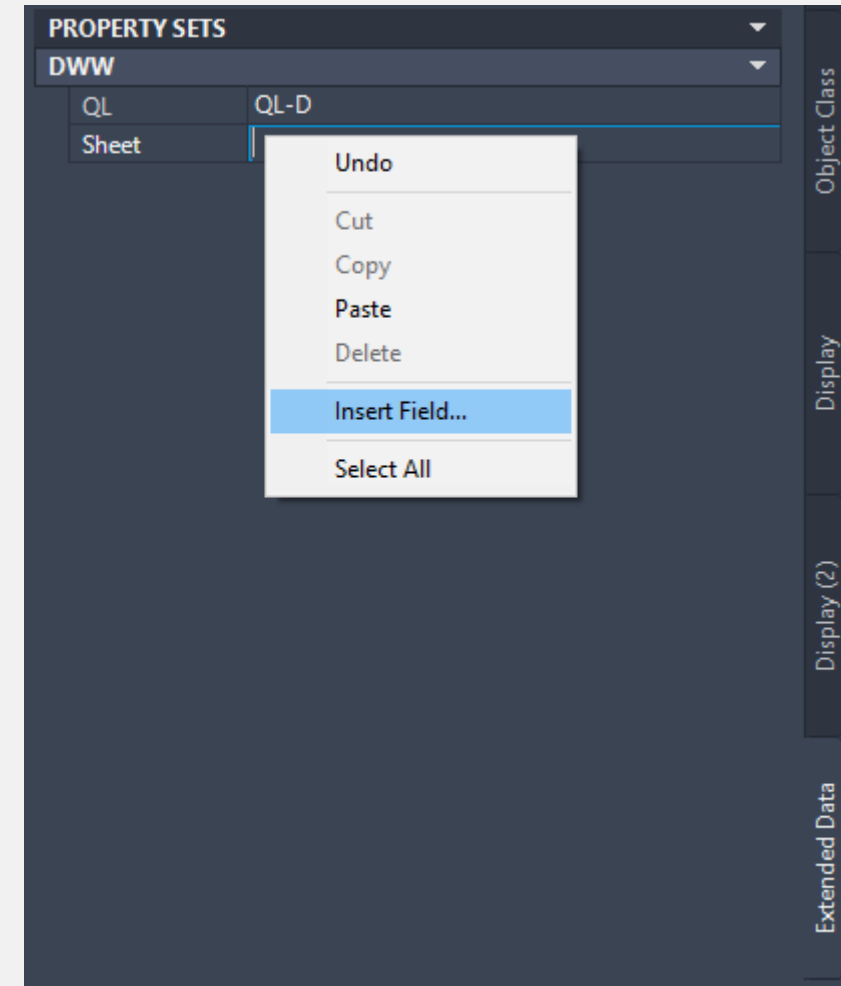
QL-B: indirect physical observation recorded by survey.

QL-C: interpolated based on known survey points.

QL-D: drawn based on records or as proposed data.

Sheet References

Add sheet references by right-clicking in the *Sheet* field and selecting, “Insert Field...” (you may enter a single sheet such as **5**, more than one sheet separated by commas such as **5,9** or a range of sheets such as **5-7**).





4.0.3a CIVIL HORIZONTAL ASSET STANDARDS (1 OF 14)

All drawings must conform to the City of Seattle [Standard Specifications and Plans](#) for Municipal Construction.

Standard plans may be referenced in the plan set (such as, "SEE STANDARD PLAN 422A"), but any modifications of the standard plans must be approved by the project engineer and illustrated as a detail in the plan set.

Civil 3D® templates and catalogs have been provided to create designs that meet the Standard Specifications and Plans, including linetypes, pipes, structures, appurtenances, fittings, and symbols (blocks/Cogo points).

Any modifications to the Pipe or Pressure Network catalogs must be documented in the BIMxp and shared with the project team.



4.0.3b CIVIL HORIZONTAL ASSET STANDARDS (2 OF 14)

Base Maps

Template (new drawing):	COS-SV-Blank.dwt
Attached reference template :	COS-SV-Master.dwt
Pipe Network catalog:	Gravity
Pipe Network parts lists: (per Standard Plan 003 & 200)	RU-STRM, RU-SSWR, RU-CSWR
Utility/paving/topo lines:	Feature Lines
Symbols per Standard Plan 003 :	Description Key Sets



4.0.3c CIVIL HORIZONTAL ASSET STANDARDS (3 OF 14)

Drainage and Wastewater (DWW) Design

Template (new drawing):	COS-New-DD.dwt
Attached reference template :	COS-DD-Ref-00-General.dwg + COS-DD-Ref-CU-DWW.dwg
Pipe Network catalog:	Gravity
Pipe Network parts lists: (per Standard Plan 003 & 200)	CU-STRM, CU-SSWR, CU-CSWR
Structure label styles:	CU-STRC-PLAN, CU-STRC-PLAN-PIPE
Pipe label styles:	C-LOOP-LRGE (double line pipes), C-LOOP-SMAL (single line pipes)



4.0.3d CIVIL HORIZONTAL ASSET STANDARDS (4 OF 14)

Grading Design

Template (new drawing):	COS-New-DD.dwt
Attached reference template :	COS-DD-Ref-00-General.dwg + COS-DD-Ref-CG-GRAD.dwg
Site(s):	Create <i>sites</i> as needed for design.
Top/bottom of pond/swale:	Feature Lines
Grading breaklines:	Feature Lines



4.0.3e CIVIL HORIZONTAL ASSET STANDARDS (5 OF 14)

Water Systems Design

Template (new drawing):	COS-New-DD.dwt
Attached reference template :	COS-DD-Ref-00-General.dwg + COS-DD-Ref-CU-WATR.dwg
Pressure Network catalog:*	Pressure
Pressure Network parts lists:*	CU-WATR-DIP, CU-WATR-MJ
Site(s):	Create <i>sites</i> as needed for design.
Water lines:	Feature Lines
Water symbols: (per Standard Plan 003 & 300)	Description Key Set: "COS Design Pressure" (use the <i>CreatePointManual</i> command to insert symbols; for a list of symbol codes, go to <i>Toolspace</i> → <i>Settings</i> → <i>Point</i> → <i>Description Key Sets</i> and right-click on the Description Key Set shown above to view the list of available codes)

*optional for design and clash detection



4.0.3f CIVIL HORIZONTAL ASSET STANDARDS (6 OF 14)

Roadway Paving Design

Template (new drawing):

COS-New-DD.dwt

Attached [reference template](#):

COS-DD-Ref-00-General.dwg + COS-DD-Ref-CP-ROAD.dwg

Site(s):

Create *sites* as needed for design.

Paving edge lines:

Feature Lines



4.0.3g CIVIL HORIZONTAL ASSET STANDARDS (7 OF 14)

Roadway Channelization Design

Template (new drawing):	COS-New-DD.dwt
Attached reference template :	COS-DD-Ref-00-General.dwg + COS-DD-Ref-CP-CHAN.dwg
Channelization lines:	Polylines
Channelization symbols: (per Standard Plan 003)	Blocks

4.0.3h CIVIL HORIZONTAL ASSET STANDARDS (8 OF 14)

Curb Ramp Design

Template (new drawing): COS-New-DD.dwt

Attached [reference template](#): COS-DD-Ref-00-General.dwg + COS-DD-Ref-CP-CURB.dwg

Site: Create an “ADA” site with Feature Line style hierarchy shown below.

FEATURE LINE STYLE HEIRARCHY	LAYER	COLOR	LINETYPE
ADA RAMP	CP-SWLK-RAMP-MINR	GREEN	CONTINUOUS
ADA RAMP WINGS	CP-SWLK-RAMP-MAJR	YELLOW	CONTINUOUS
ADA LANDING	CP-SWLK-RAMP-LEVL	YELLOW	GRID1
ADA BREAKLINE	CP-SWLK-GRAD-BRKL	22	HIDDEN2
ADA CURB BACK	CP-ROAD-CURB-BACK	CYAN	CONTINUOUS
ADA CURB FACE	CP-ROAD-CURB-FACE	CYAN	CONTINUOUS
ADA CONCRETE	CP-SWLK-CONC-OTLN	YELLOW	CONTINUOUS
ADA FLOWLINE	CP-ROAD-CURB-FEAT	CYAN	CONTINUOUS
ADA DRIVEWAY	CP-SWLK-GRAD-BRKL	22	HIDDEN2

Curb and ramp breaklines: Feature Lines

Line and curve labels: Use *AddFeatureLineLabels* command to add “Line and Curve” labels.

Curb Returns

Curb return lines: Arcs
(geometry used to create tables in relation to surfaces and alignments or coordinates)



4.0.3i CIVIL HORIZONTAL ASSET STANDARDS (9 OF 14)

Roadway Signalization Design

Template (new drawing):

COS-New-DD.dwt

Attached [reference template](#):

COS-DD-Ref-00-General.dwg + COS-DD-Ref-CT-SIGL.dwg

Site(s):

Create *sites* as needed for design.

Signalization lines:

Feature Lines

Signalization symbols per [Standard Plan 003](#):

Description Key Set: "COS Design Signalization"
(use the *CreatePointManual* command to insert symbols; for a list of symbol codes, go to *Toolspace* → *Settings* → *Point* → *Description Key Sets* and right-click on the Description Key Set shown above to view the list of available codes)



4.0.3j CIVIL HORIZONTAL ASSET STANDARDS (10 OF 14)

Electrical Site Design

Template (new drawing):

COS-New-DD.dwt

Attached [reference template](#):

COS-DD-Ref-00-General.dwg + COS-DD-Ref-CS-ELEC.dwg

Site(s):

Create *sites* as needed for design.

Electrical lines:

Feature Lines

Electrical symbols per [Standard Plan 003](#):

Description Key Set: "COS Design Electrical"
(use the *CreatePointManual* command to insert symbols; for a list of symbol codes, go to *Toolspace* → *Settings* → *Point* → *Description Key Sets* and right-click on the Description Key Set shown above to view the list of available codes)



4.0.3k CIVIL HORIZONTAL ASSET STANDARDS (11 OF 14)

Lighting Site Design

Template (new drawing):

COS-New-DD.dwt

Attached [reference template](#):

COS-DD-Ref-00-General.dwg + COS-DD-Ref-CS-LITE.dwg

Site(s):

Create *sites* as needed for design.

Lighting lines:

Feature Lines

Lighting symbols per [Standard Plan 003](#):

Description Key Set: "COS Design Lighting"
(use the *CreatePointManual* command to insert symbols; for a list of symbol codes, go to *Toolspace* → *Settings* → *Point* → *Description Key Sets* and right-click on the Description Key Set shown above to view the list of available codes)



4.0.3 | CIVIL HORIZONTAL ASSET STANDARDS (12 OF 14)

Roadway Signage Design

Template (new drawing):

COS-New-DD.dwt

Attached [reference template](#):

COS-DD-Ref-00-General.dwg + COS-DD-Ref-CT-SIGN.dwg

Signage symbols per [Standard Plan 003](#):

Description Key Set: "COS Design Signage"
(use the *CreatePointManual* command to insert symbols; for a list of symbol codes, go to *Toolspace* → *Settings* → *Point* → *Description Key Sets* and right-click on the Description Key Set shown above to view the list of available codes)



4.0.3m CIVIL HORIZONTAL ASSET STANDARDS (13 OF 14)

Tree Planting Design

Template (new drawing):	COS-New-DD.dwt
Attached reference template :	COS-DD-Ref-00-General.dwg + COS-DD-Ref-LP-TREE.dwg
Tree symbols per Standard Plan 003 :	Description Key Set: "COS Design Trees" (use the <i>CreatePointManual</i> command to insert symbols; for a list of symbol codes, go to <i>Toolspace</i> → <i>Settings</i> → <i>Point</i> → <i>Description Key Sets</i> and right-click on the Description Key Set shown above to view the list of available codes)



4.0.3n CIVIL HORIZONTAL ASSET STANDARDS (14 OF 14)

Irrigation Systems Design

Template (new drawing):

COS-New-DD.dwt

Attached [reference template](#):

COS-DD-Ref-00-General.dwg + COS-DD-Ref-LI-IRRG.dwg

Site(s):

Create *sites* as needed for design.

Irrigation lines:

Feature Lines

Irrigation symbols per [Standard Plan 003](#):

Description Key Set: "COS Design Irrigation"
(use the *CreatePointManual* command to insert symbols; for a list of symbol codes, go to *Toolspace* → *Settings* → *Point* → *Description Key Sets* and right-click on the Description Key Set shown above to view the list of available codes)



4.0.4a EXTERNAL REFERENCING STANDARDS (1 OF 2)

External Referencing, or XREF'ing, is the standard procedure for concurrent engineering.

All XREFs must be set to OVERLAY and RELATIVE in sheet drawings and overlaid in the correct order so the base map is on the bottom and the primary XREF is on the top. To avoid duplicate contours and alignments, freeze base map and secondary XREF contours and alignments if those objects are shown in the primary XREF.

If information is not visible through a viewport, make model space of the viewport active, open Layer Manager, check the "VP Freeze" column for frozen layers and thaw them if necessary. After doing this, if linework appears but annotation is still invisible, set *ANNOALLVISIBLE* to 1 to see annotation not associated with the viewport scale.



4.0.4b EXTERNAL REFERENCING STANDARDS (2 OF 2)

Every design discipline must be a separate XREF drawing (drawings are more efficient if they only contain objects of a single discipline). It is the standard to publish each discipline to ArcGIS separately (see [Section 5.3](#)) at milestones specified in the BIMxp and keeping disciplines in separate drawings makes this process easier.

To create the highest-quality deliverables, these requirements must be followed:

1. The base map drawing must be XREF'd into design drawings as a basis for the design from this location: ...\Civil\04-Survey\D-XREF (do not make copies of the base map).
2. Do not insert unnecessary items (things that won't be printed, referenced, or published) into drawings.
3. Use the [Autodesk Batch Save Utility \(Standalone\)](#) to keep drawings clean by running cleanup scripts (see: ...\Civil\01-Support\COS-defaultClean.lsp) to purge registered apps and run audits to fix errors. This will reduce errors showing up in referenced drawings.
4. BIM is a cloud-only system thus **you must not XREF drawings from local or network locations (otherwise a "related data" folder will appear in the cloud)**. Before referencing a drawing, save it to the cloud first, and then create the external reference.
5. Work in progress files must be saved in a *WIP* subfolder and not referenced into any standard drawings.
6. Sheet drawings (paper-space layouts) must reference the base map and design drawings into model-space, and display all or a portion of the composite plan view with viewports in sheet drawings. Overlay the primary XREF last so it is on top of all other XREFs (to put the primary XREF back on top, use the COPYBASE command with a base point of 0,0,0 and erase the XREF; then use the PASTECLIP command with the insertion point 0,0,0).



4.0.5 COVER SHEET STANDARDS

Setup the cover sheet and place the sheet index. The sheet index may need to go on another sheet if the plan set contains more than 55 sheets. The cover sheet must contain:

- Vicinity map at scale: 1" = 1 MILE
- Location map (may go on another sheet if more room is required) at scale: 1" = 400'
- Datum block
 - Vertical datum note:
 - Benchmark reference number, description (including location), and elevation
 - Datum name
 - Horizontal datum note:
 - Basis of bearing description
 - Description of monuments used for basis of bearing
 - Coordinates on each monument used for basis of bearing
 - Bearing and distance between the two monuments
 - Source of coordinates (published, GPS, or what?)
- Detail & section referencing block
- Sheet index table (may go on another sheet if more room is required)
- Notes (may go on another sheet if more room is required)

GENERAL NOTES
 1. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 2. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 3. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 4. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 5. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 6. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 7. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 8. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 9. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 10. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 11. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 12. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 13. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 14. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 15. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 16. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 17. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 18. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 19. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.
 20. SEE GENERAL NOTES ON SHEET 1 OF THIS SET.

SHEET INDEX

SHEET NO.	DESCRIPTION
1	COVER SHEET
2	SECTION A-A
3	SECTION B-B
4	SECTION C-C
5	SECTION D-D
6	SECTION E-E
7	SECTION F-F
8	SECTION G-G
9	SECTION H-H
10	SECTION I-I
11	SECTION J-J
12	SECTION K-K
13	SECTION L-L
14	SECTION M-M
15	SECTION N-N
16	SECTION O-O
17	SECTION P-P
18	SECTION Q-Q
19	SECTION R-R
20	SECTION S-S
21	SECTION T-T
22	SECTION U-U
23	SECTION V-V
24	SECTION W-W
25	SECTION X-X
26	SECTION Y-Y
27	SECTION Z-Z
28	SECTION AA-AA
29	SECTION BB-BB
30	SECTION CC-CC
31	SECTION DD-DD
32	SECTION EE-EE
33	SECTION FF-FF
34	SECTION GG-GG
35	SECTION HH-HH
36	SECTION II-II
37	SECTION JJ-JJ
38	SECTION KK-KK
39	SECTION LL-LL
40	SECTION MM-MM
41	SECTION NN-NN
42	SECTION OO-OO
43	SECTION PP-PP
44	SECTION QQ-QQ
45	SECTION RR-RR
46	SECTION SS-SS
47	SECTION TT-TT
48	SECTION UU-UU
49	SECTION VV-VV
50	SECTION WW-WW
51	SECTION XX-XX
52	SECTION YY-YY
53	SECTION ZZ-ZZ
54	SECTION AA-AA
55	SECTION BB-BB

DETAIL AND SECTION REFERENCING

VICINITY MAP, LOCATION MAP, DETAIL AND SECTION REFERENCING, GENERAL NOTES AND SHEET INDEX

SPOKANE, ST 1-5
SEISMIC BACKLOG

60% DESIGN

DATE: 11/11/2021

PROJECT NO: 111111

DESIGNER: 111111

CHECKED: 111111

APPROVED: 111111

111111



4.0.6a SURVEY CONTROL SHEET STANDARDS (1 OF 2)

Survey control information must be included in every plan set. The survey control information may be included on the location map or may be shown on its own sheet. The survey control information sheet must meet [SIP requirements](#), including these basic items:

- Street names.
- Description of every monument (cased, buried, surface brass cap, etc.).
- Coordinates for each monument, which must include Northing and Easting.
- Bearing and distance on each street between each two monuments, and distance from offset monument (if any) to intersection.
- Radius, delta angle, and arc length on any curving monument lines or baselines.
- Bearing and distance and/or dimension from monumented line to construction baselines (if any).
- Stations at intersections and all monuments.
- Station numbering must be unique for each street. Come up with different starting stations for each street alignment so that the numbers do not overlap (start with 10+00 and go up from there).
- Survey alignments must be labeled with 100-foot tics.



4.0.6b SURVEY CONTROL SHEET STANDARDS (2 OF 2)

- Stationing on North/South alignments must increase to the South to abide by city presentation standard of north up or left. Stationing on East/West alignments must increase to the East to abide by city presentation standard of north up or left.
- Station at the beginning, end, at each intersection and at PCs and PTs of curving monument lines (no stationing that starts at property line, end of existing paving, or other indeterminate point).
- Description and elevation of any site BMs or control points with elevation (it is ok to use monuments with elevations as site BMs).
- Dimension from monument line to right-of-way line on each street; if variable, show dimension at each end of block.
- Washington State Licensed surveyor's stamp (stamp must be signed if plans are complete).
- Current contact information for the surveyor whose stamp appears on the drawing (name, address, phone, and/or email).



4.0.7a PLAN AND PROFILE SHEET STANDARDS (1 OF 10)

Proposed alignments must reside in the XREF drawing they are associated with (for example, a water main alignment must be created in the X-WATR drawing) and be labeled with 100-foot tics.

All stationing callouts in profiles must reference the project control alignment (usually the surveyed roadway centerline). Some Profiles may be created for presentation purposes (shown on sheets) while some may be created for reference or design purposes but not shown on the sheets.

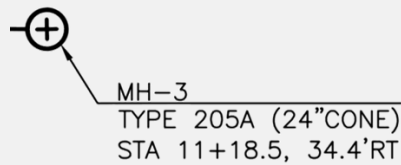
Profile Views (grids) in model space are for reference only and are used to align with the grids provided in layouts of sheet drawings through viewports (Profile View layers are set to not print).



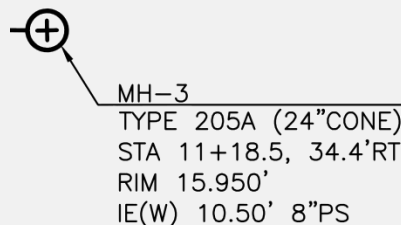
4.0.7b PLAN AND PROFILE SHEET STANDARDS (2 OF 10)

Profile views are typically shown above plan views on utility sheets and shown under plan views for roadway sheets. The plan and profile views must be aligned so that the improvement is in direct relationship between the two views as much as possible.

Plan views must show callouts containing horizontal information (such as stations and offsets), including vertical information only if it is not represented in a profile view.



Profiles must show callouts containing vertical information (such as invert and rim elevations), including horizontal information only if it cannot be represented in a plan view.



All disciplines (paving plans, watermain plans, sewer plans, etc.) must use the same match line locations.

Street names must be shown.

Plan views must have a North arrow with a bar scale under it.

For multi-discipline projects, show nearby improvements for context (such as showing water improvements on a drainage plan) but freeze the annotation and change the linework to color 145. To do this, overlay an XREF of the secondary improvement, viewport freeze (VP Freeze) secondary improvement layers that don't need to be shown (such as annotation) and change the viewport color (VP Color) of the remaining secondary improvement layers to color 145.

Proposed geo-referenced features and vertices of area limits must be labeled in such a way as to easily locate in the field (such as station/offset labels, Northing/Easting labels or point labels referring to a table containing station/offset data).



4.0.7c PLAN AND PROFILE SHEET STANDARDS (3 OF 10)

Match Lines

Adjoining sheets must use match lines at an even station with the sheet number referenced.

Dimensioning between features shown on separate sheets must be shown with double arrow-heads at the match line.

The scale must not change across match lines.

Match lines may not be placed in intersections.

Construction Stormwater Erosion Control (CSEC) Plans

Soil, vegetation, and tree protection shown; use an existing lineweight (color 125) and a proposed callout stating that the item is to be protected.

A legend must be included on CSEC sheets for linetypes, symbols, and hatch patterns used.

Site Prep and Removal/Demolition Plans

Show clearing and grubbing, utility relocations, building removal and other items being removed that are not covered elsewhere in the plan set.

Items to be removed must be shown in bold, crossed out or covered with a hatch pattern.

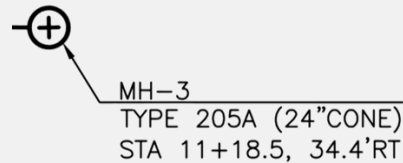
All other removal items must be shown on the sheets they are associated with in an existing lineweight (color 125) with a proposed (bold) callout.



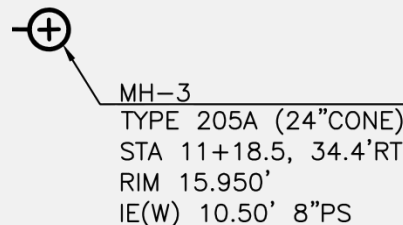
4.0.7d PLAN AND PROFILE SHEET STANDARDS (4 OF 10)

Utility Plans

- Leader callout showing the identification of each structure (during the design phase, use name/number in this format: MH-#, VAULT-#, CB-#, INL-#, etc.; ultimately maintenance holes must have the endpoint identification number as determined by the project team) above the "type" as defined in the City of Seattle Standard Plans and the station and offset from a monument line or construction baseline to:
 - center of structures (maintenance holes, cleanouts, hydrants, valves, etc.), except most catch basins and inlets are stationed at the face of curb.
 - all horizontal break points and all connection points.



NOTE: if a structure is not shown in a profile, also include the rim elevation and invert elevation(s) with compass direction(s) in parenthesis.





4.0.7e PLAN AND PROFILE SHEET STANDARDS (5 OF 10)

Utility Plans (continued)

- Each pipe run (between structures or maintenance holes) must have a loop-leader callout showing the size, type of pipe and material in parenthesis.

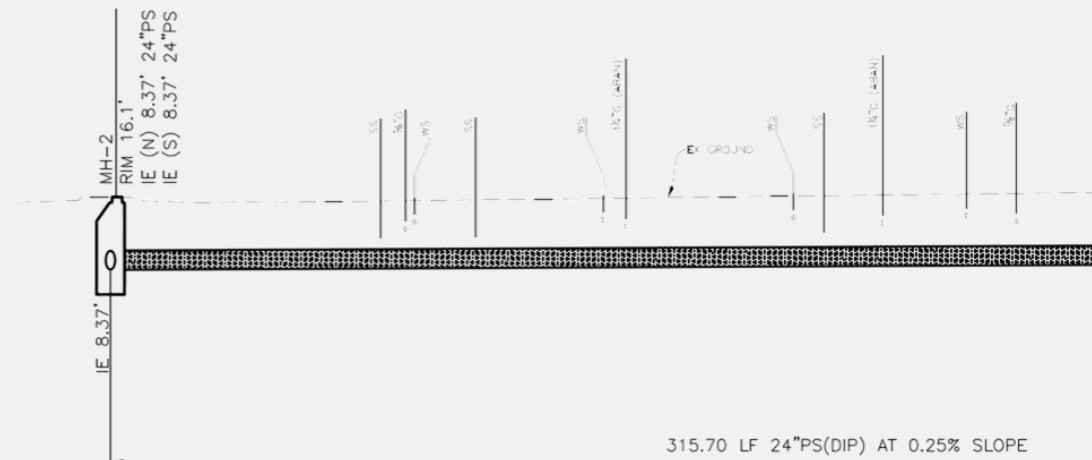


- Double-line pipes shown in plan views are filled with hatch while maintenance holes and structures are not.

4.0.7f PLAN AND PROFILE SHEET STANDARDS (6 OF 10)

Utility Profiles

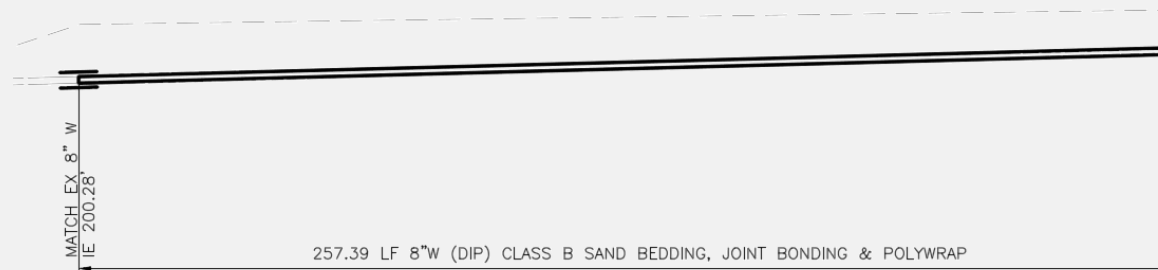
- Horizontal scale must match associated plan view scale. Vertical scales may vary.
- Pipes are projected onto the profile view(s) aligned with existing street control stationing as a general rule (exceptions: pipes in non-roadway sites such a parking lots, parks or hillsides may need to be shown as true-length for clarity).
- Profiles are required for all sewer, storm drain, combined sewer and water mains and must include:
 - Each gravity pipe run must have a horizontal dimension line below that goes from center of MH to center of MH showing the length (linear feet), size (inches), type, material in parenthesis, and slope (percentage). For example: 60 LF 12"PS (DIP) AT 2.00% SLOPE. Other pipes connected to drainage structures are dimensioned from the inside face of structure walls.



4.0.7g PLAN AND PROFILE SHEET STANDARDS (7 OF 10)

Utility Profiles (continued)

- ...and must include:
 - Vertical callout above each structure showing the structure's identification (name/number) on the left side and rim elevation on the right side (in this format: RIM ##.##'). Station and offset callouts are not required in utility profiles unless not shown anywhere else.
 - Vertical callout below structures and pipes showing elevations at each invert, connection, and/or grade break on each pipe (in this format: IE ##.##').
 - Each water pipe run must have a horizontal dimension line below showing the length (linear feet), size (inches), type (W), material in parenthesis, class of bedding and type of protection. For example: 60 LF 12"W (DIP), CLASS B SAND BEDDING, JOINT BONDING & POLYWRAP.



- Radius and delta angle of curved pipes, if applicable.
- Double-line pipes shown in profile views are filled with hatch while maintenance holes and structures are not.

4.0.7h PLAN AND PROFILE SHEET STANDARDS (8 OF 10)

Paving Plans

Show outlines of castings/openings in paved area.

Spot elevations are shown at least every 25 feet at the crown, flow line, top of curb and property line with the following descriptions (may be shown in a point table):

CROWN

EDGE OF PAVEMENT

FLOW LINE

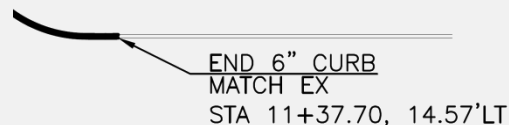
BACK OF WALK

FRONT OF WALK

GROUND LINE

GRADE BREAK LINE

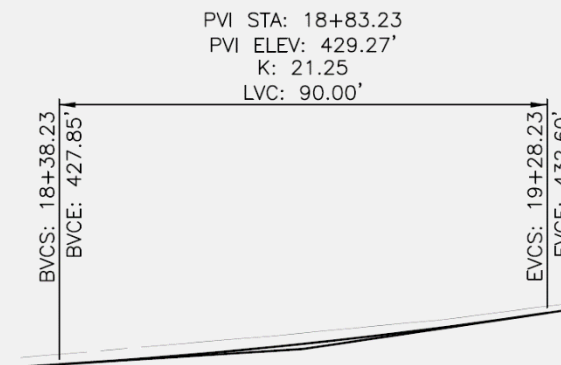
Station and offset (or station and pavement width) from monument line or construction baseline to all beginnings and ends of curb and/or "match existing" points, angle points, and changes of curb height.



4.0.7i PLAN AND PROFILE SHEET STANDARDS (9 OF 10)

Paving Profiles

- Call out whether the profile refers to the centerline of road, top of curb, gutter/flow line, or other feature.
- Show elevations and stations at all grade breaks.
- Show elevations at all “match existing” points.
- Provide a description of any vertical curves (required for grade changes greater than 1%). The description must include:
 - VPI station and elevation.
 - Length of vertical curve (min along streets is 75’).
 - High or low point station and elevation, if applicable.





4.0.7j PLAN AND PROFILE SHEET STANDARDS (10 OF 10)

Paving Cross Sections

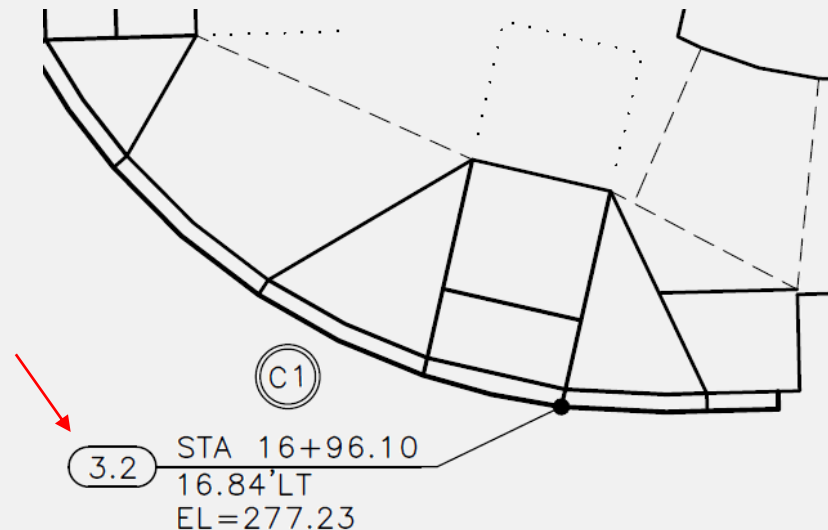
- Dimension from centerline to saw cut, flow line (if other than base of curb), face of curb, sidewalk and sidewalk width, and right-of-way line.
- Show height of curb or dimensions of thickened edge of asphalt.
- Show cross slope on all paved surfaces.

4.0.8a INTERSECTION PLAN SHEET STANDARDS (1 OF 7)

Intersection geometry must be shown on dedicated sheets at 1"=5' scale (show street names; match lines are not required).

Depict curb returns and ADA ramps per the following:

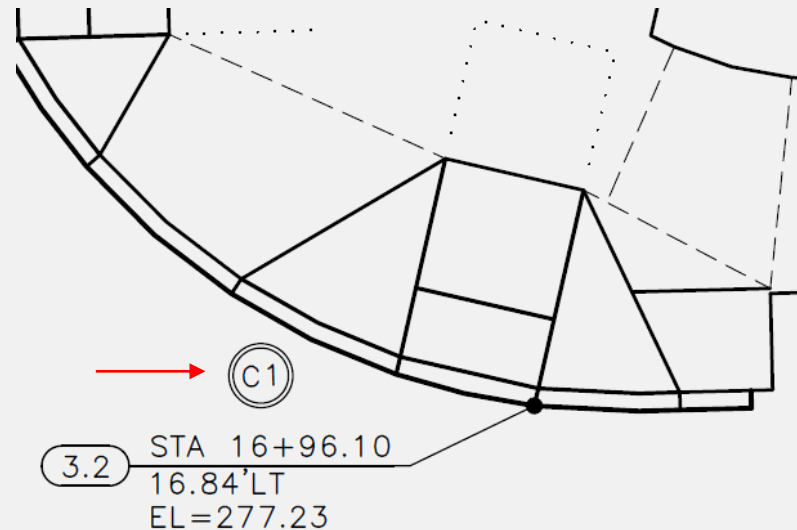
- Ramp plan views and associated tables must be shown together (through viewports) on the same sheet.
- Number the ramps (clockwise order on the sheets) in rounded rectangle labels that also include the station, offset and the **shortest-side-corner** of ramps at the flowline. This is the starting point, and slopes and distances are used to build the ramp from here.



Use a decimal point to separate the intersection number from the ramp number, for example: 35.4 means, the fourth ramp at the thirty-fifth intersection.

4.0.8b INTERSECTION PLAN SHEET STANDARDS (2 OF 7)

- Insert the C-CURB block (curb return number in double circles) near the curb arc.



- Underground utility annotation on the base map must be frozen.
- For clarity, freeze any existing ramps shown on the base map.
- Site restoration hatch patterns must not be shown.
- Label ADA ramp slopes with slope arrows (pointing downstream) to indicate the direction of the slope. Use distance & slope in a dimension, where required.
- Make sure roadway/centerline stationing is shown.



4.0.8c INTERSECTION PLAN SHEET STANDARDS (3 OF 7)

- Add ramp notes (varies by type) to each intersection sheet containing curb ramps.

RAMP NOTES

1. REFER TO 422 RAMP STANDARD PLANS

- Add legend for grade breaks and landings.

LEGEND

----- GRADE BREAK
 LANDING

- Add a “MEF” (maximum extent feasible) table for each ramp, per SDOT requirements, along with a list of the codes:

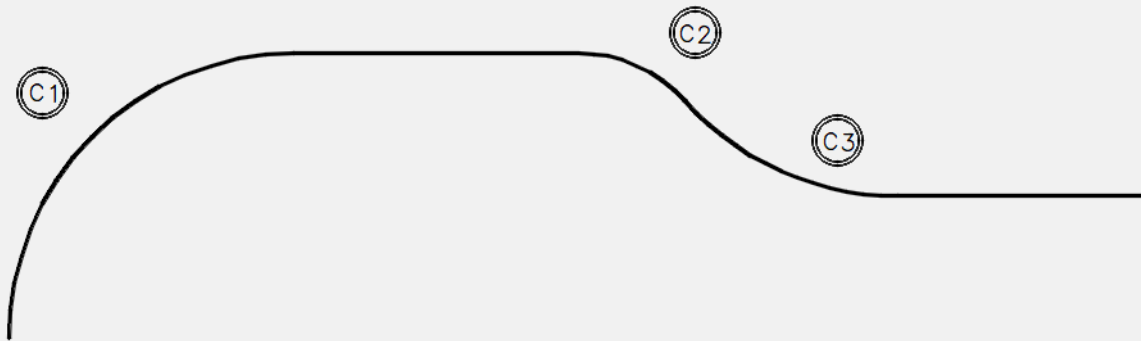
RAMP	TYPE	MEF CODE
34.1	422d	6
34.2	422a	–
34.3	422a	–
35.1	422a	6
35.2	422d	–
35.3	422a	–
35.4	422a	6
35.5	422a	6

MEF CODES

- *1. RIGHT-OF-WAY AVAILABILITY
- *2. ROADWAY STRUCTURAL CONSTRAINT; WALL, AREAWAY, OR BRIDGE
- *3. ADJACENT DEVELOPED FACILITY
- *4. DRAINAGE
- *5. HISTORIC FEATURE
- *6. EXISTING ROAD/SIDEWALK SLOPES
- *7. EXISTING UTILITY VAULT OR UTILITY STRUCTURE
- *8. (OTHER), DESCRIBE, ADD ANNOTATION

4.0.8d INTERSECTION PLAN SHEET STANDARDS (4 OF 7)

- Delta angle, radius, tangent and length on all curb returns and reverse curves, elevations at PC's, PT's, PRC's, PCC's, quarter points, and high and low points of curb returns (along flowline).



Example curb return plan view for illustration-purposes only.

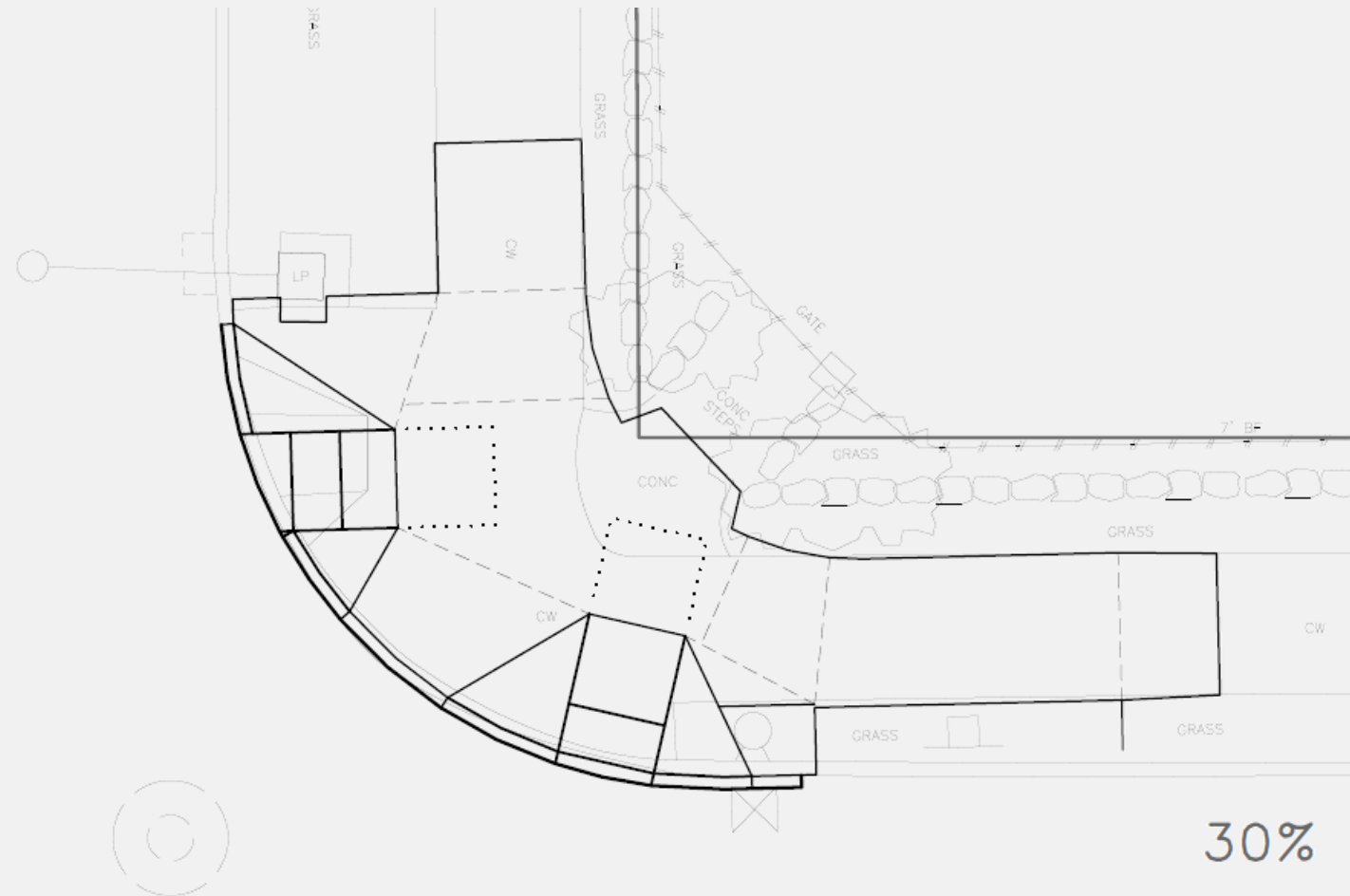
CURB RETURN – E COLUMBIA ST

NO.	POINT	STATION	OFFSET	FLOW LINE ELEVATION	CURVE GEOMETRY
C1	PC	3+34.39	32.54'RT	291.84	$\Delta=90^{\circ}04'14''$ $L=31.44'$ $R=20.00'$ $T=-20.02'$
	1/4	3+35.91	24.88'RT	291.69	
	1/2	3+40.24	18.38'RT	291.39	
	3/4	3+46.73	14.04'RT	291.13	
	PT	3+54.39	12.51'RT	290.78	
C2	PC	3+59.38	12.51'RT	290.58	$\Delta=41^{\circ}16'21''$ $L=7.2'$ $R=10.00'$ $T=3.77'$
	1/2	3+62.90	13.15'RT	290.46	
	PRC	3+65.98	14.99'RT	290.29	
C3	1/2	3+72.12	18.68'RT	289.90	$\Delta=41^{\circ}0'16''$ $L=14.41'$ $R=20.00'$ $T=7.53'$
	PT	3+79.17	19.96'RT	289.57	

- Elevations of paving surrounding ADA ramps shall be shown as spot elevations on the plan.

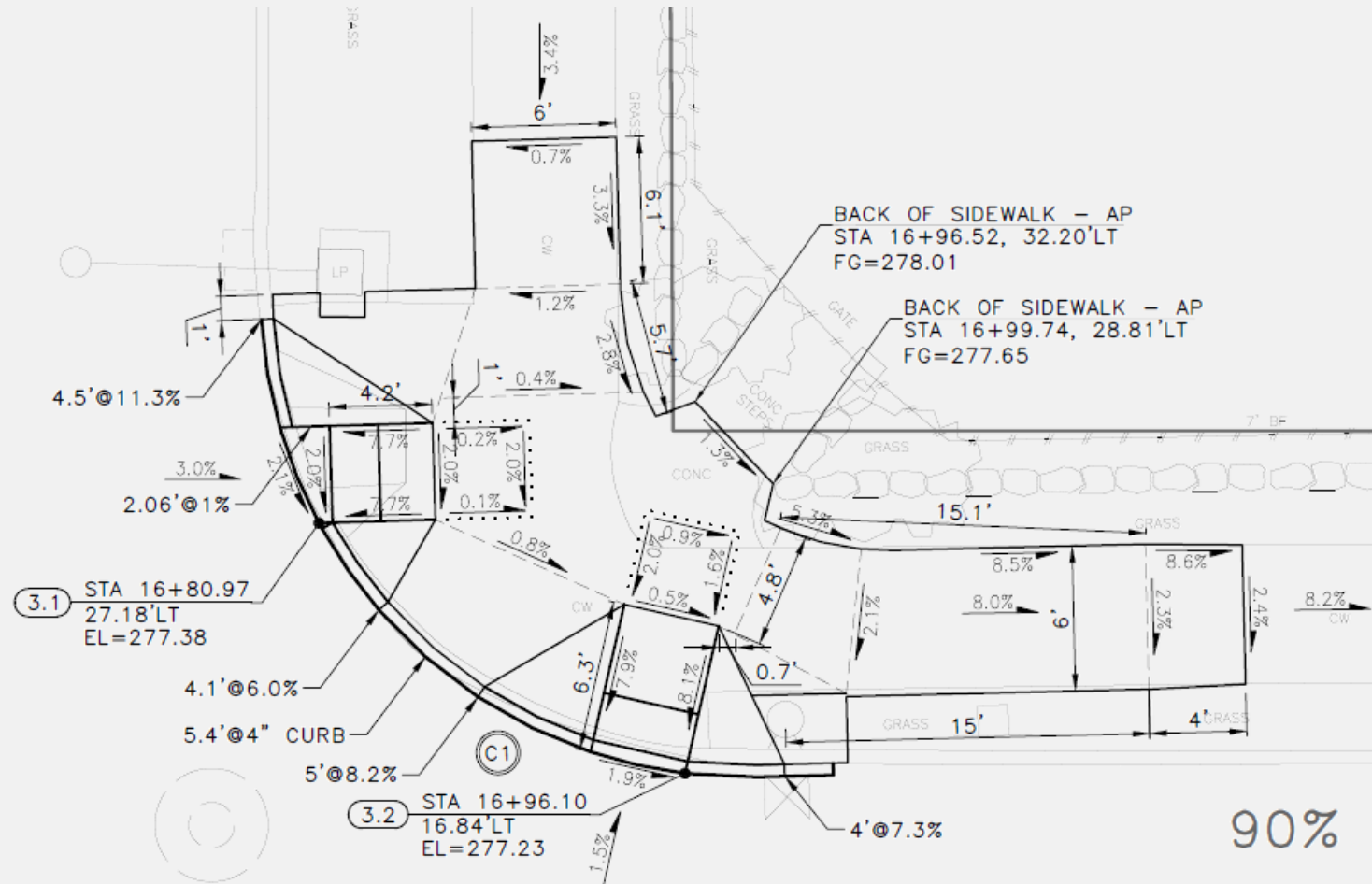
4.0.8e INTERSECTION PLAN SHEET STANDARDS (5 OF 7)

30% Example: linework drawn.



4.0.8g INTERSECTION PLAN SHEET STANDARDS (7 OF 7)

90% Example: add dimensions and additional annotation to meet the requirements.





4.0.9 DETAIL SHEET STANDARDS

- Add detail and section viewports to sheets via the Sheet Set Manager “Model Views” tab.
- Details must be drawn to scale and are typically dimensioned in an architectural format.
- Details must be separated into individual drawings (XREFs) by discipline. A detail drawing (XREF) must only contain a set of detail views that share the same scale (unless a detail contains a blow-up).
- There are two types of sections: “civil sections” and “detail sections”. Civil sections relate to a plan view and are typically dimensioned in an engineering format while detail sections relate to a detail view and are dimensioned in an architectural format.
- Details must be labeled with a title, scale centered under the title, reference numbers in a bubble callout to the right of the title and a North arrow.
- Sections must be labeled with a letter designation in this format: SECTION X-X # (sheet reference is shown to the right of the title) and scale centered underneath.
- Detail and section viewports must be numbered/lettered and arranged in order to be read from left-to-right/top-to-bottom.
- If a detail is provided in the City of Seattle Standard Plans, simply refer to it by number (e.g. STANDARD PLAN NO ###X); it is not required to be in the plan set unless it is modified.



4.1 ANNOTATION STANDARDS

Annotation must go in model space (of XREF drawing files) with the linework it is associated with; however, there are cases in which annotation (such as notes, legends, reference callouts, etc.) may appear in paper space.

All annotation must be UPPERCASE and set to the correct *ANNO* layer; see [layer standards database](#).

TEXT STYLES				
Style Name	Purpose	Font (more info)	Width Factor	Oblique Angle
COS	Proposed design text	COS-ROMANS.TTF	1.00	0
COS-Existing	Base map text	COS-ROMANS.TTF	1.00	0
COS-Record	Record drawing text	COS-ROMANS.TTF	1.00	20
COS-ADA	Record drawing text	COS-ROMANS.TTF	0.90	0
ANNOTATION SETTINGS				
Purpose	Size (at 1 anno scale factor)	Common Layers		
Small title block text	0.08	G-ANNO-TTLB		
Existing features (base map text)	0.08	V-ANNO or R-ANNO		
ADA slopes	0.10	C-ANNO		
Proposed text	0.125	C-ANNO or G-ANNO		
Sub-titles	0.1875	C-ANNO-SUBT		
Titles	0.25	C-ANNO-TITL		
Side Street Names	0.1875	R-ANNO-RWAY-SUBT		
Main Street Names	0.3125	R-ANNO-RWAY-TITL		



4.1.1 ABBREVIATIONS

Refer to [Standard Plan 002](#) for the standard list of abbreviations to be used on drawings.

Abbreviation meanings must not be changed, and additional abbreviations may be used if they are defined in an abbreviations list in the plan set.



4.1.2 ANNOTATIVE TEXT, DIMENSIONS, AND MULTILEADERS

All annotation must be set to “annotative”. Set the text size for the drawing scale factor of 1 (plotted text height) in model-space and allow AutoCAD® to size and display the annotation based on the annotative scale set in the drawing or viewport.

For example, if text with a height of 0.08 is placed in model-space and the annotative scale is set to 1”=20’, AutoCAD® will automatically size the text to 1.6 (viewports with a scale of 1”=20’ will also display the text height as 1.6 which will then plot at 0.08 on a full-size plot).

Annotative Scale List

For scaling to work properly with XREFs, standard scale name formats must be followed. Here are two standard formats (please note that there is a space on both sides of the equal sign):

Engineering scale format: 1” = x’

Architectural scale format: x/x” = 1’-0”

Settings for Existing Features

- Arrowhead size: 0.1
- Arrowhead symbol: Closed filled
- Text style: COS-Existing
- Text height: 0.08
- Leader type: Spline

Settings for Proposed Features

- Arrowhead size: 0.14
- Arrowhead symbol: Closed filled
- Text style: COS
- Text height: 0.125
(curb ramp slope labels have a 0.1 text height)
- Leader type: Straight



4.1.3 MULTILEADER STANDARDS

The left edge of multileader text must line up vertically (left justification) and the leader(s) must always extend to text. Leaders on the left side of the text must be aligned with the middle of the top line of the text.

Leaders on the right side must be aligned with the middle of the bottom line of text.



If the information below the first line is secondary information (such as rim, inverts, etc.) the leader must underline the first line of text.





4.1.4 NOTE STANDARDS

Use MTEXT to create numbered notes. On the general notes sheet(s) every set of notes must have a sub-title that says, "UNLESS OTHERWISE NOTED:". The title must be underlined and have a 0.25 text height; sub-titles must have a 0.1875 text height; and text must have a 0.125 text height.



GENERAL NOTES
UNLESS OTHERWISE NOTED:
1. NOTE TEXT

Notes and legends on all other sheets don't need a sub-title and the title must be underlined and have a 0.1875 text height.



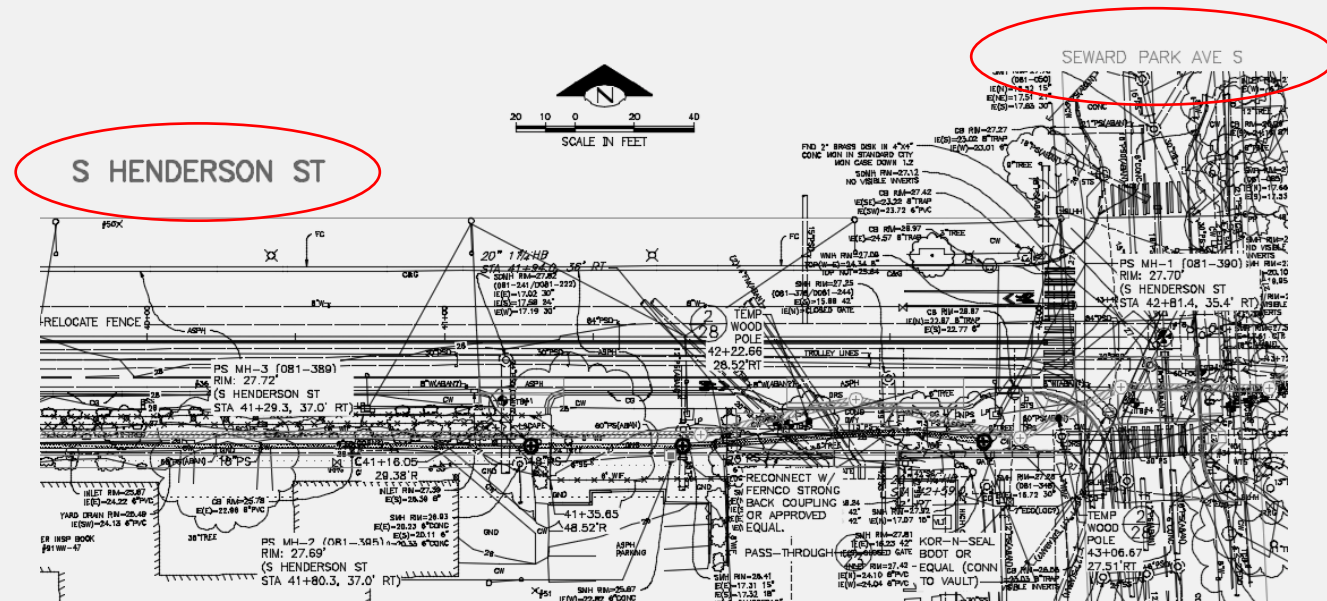
NOTES:
1. NOTE TEXT

4.1.5 STREET NAME STANDARDS

When an XREF is overlaid into a sheet drawing, the street names in the XREF must be frozen through the viewport or set to not plot. Add street name text labels in Paper Space.

Main streets must have a 0.3125 text height, color 205 (screening: 60).

Side streets must have a 0.1875 text height, color 145 (screening: 55).

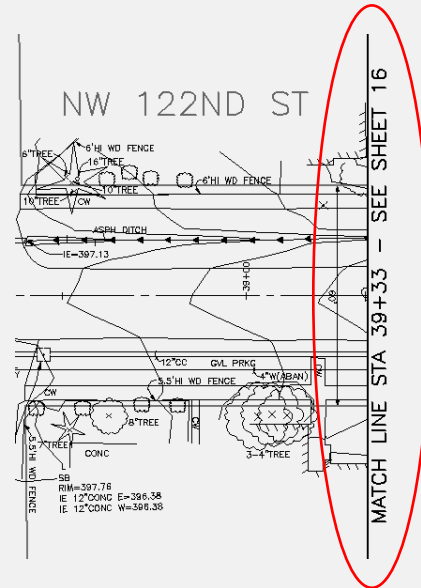


4.1.6 MATCH LINE STANDARDS

Match line text must be yellow, 0.1875, center-justified and aligned with and centered on the mid-point of the match line in this format (use a field for the sheet #):

MATCH LINE STA ##+## - SEE SHEET #

Use the *SSM-match_line-L.dwg* and *SSM-match_line-R.dwg* blocks, available with the Sheet Set Manager template, for left and right match lines, respectively.



AutoCAD® Fields can be inserted for Sheet Set Manager view numbers and sheet numbers into Text, MTEXT, Dimensions, Multileaders and block attributes. To do this, use the CTRL+F keyboard shortcut or right-click and select "Insert Field..." when in any AutoCAD® text editor and select the "SheetSet" or "SheetView" field name.

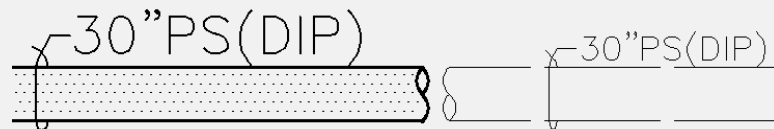
4.1.7 LOOP LEADER STANDARDS

Utility pipes in plan views must be called out with a loop leader callout. There are loop leader Civil 3D® Pipe Network label styles and dynamic loop leader callout blocks available in the templates and at this location:

...\Civil\01-Support

- Loop-Leader-Proposed-L.dwg
- Loop-Leader-Proposed-R.dwg
- Loop-Leader-Existing-L.dwg
- Loop-Leader-Existing-R.dwg

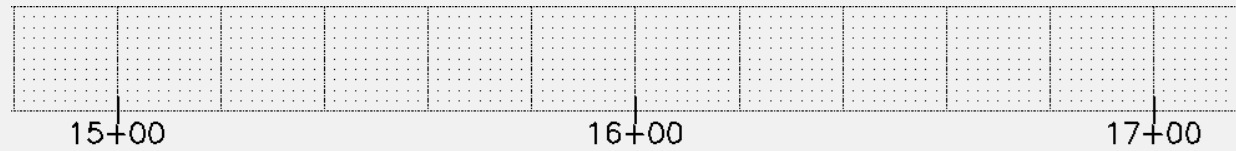
These blocks are not annotative because the loop needs to maintain a constant size but the text within the blocks is. To add new scales to loop leader text, first set ANNOAUTOSCALE to 4 and then change the drawing scale. This procedure applies the new scale to all annotative objects.





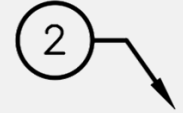
4.1.8 SHEET PROFILE GRID STATIONING STANDARDS

Profile grid stationing text must be yellow, 0.1875, center-justified and aligned under major grid lines with a 0.25" tic mark.

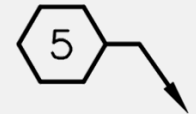


4.1.9 KEY NOTE STANDARDS

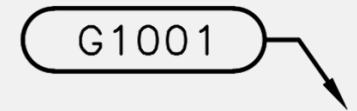
Key notes are called out on the plan view with a circle in this format: #
(i.e. a number inside a circle).



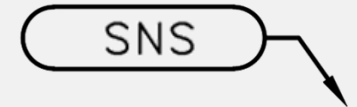
Vehicle & pedestrian signal heads are called out on the plan view with a hexagon in this format: #
(i.e. a number inside a hexagon).



Grading point labels are called out on the plan view with a rounded rectangle in this format: G#
(i.e. G1001 in a rounded rectangle)



Sign relocation code labels are called out on the plan view with a rounded rectangle.
(i.e. SNS in a rounded rectangle)





4.1.10 TABLE STYLE STANDARDS

Title Cell Style

- Alignment: Middle Center
- Text style: COS
- Text height: 0.25
- Text color: Green
- No border above, to the left, and to the right.

Header Cell Style

- Alignment: Middle Left
- Text style: COS
- Text height: 0.1875
- Text color: Yellow
- Border color: Yellow (all borders)

Data Cell Style

- Alignment: [varies]
- Text style: COS
- Text height: 0.125
- Text color: Black/White (color 7)
- Border color: Yellow (all borders)



4.2 HATCH PATTERN STANDARDS

Additional hatch patterns, used at the direction of the project engineer, must be displayed in a legend.

HATCH PATTERN SETTINGS				
Description	Pattern	Angle	Color	Annotative Scale
Combined sewer mainlines (double line pipe fill)	DOTS	90	3	0.5 (1"=20' scale: 10)
Sanitary sewer mainlines (double line pipe fill)	ANSI31	90	3	1.0 (1"=20' scale: 20)
Storm drain mainlines (double line pipe fill)	ANSI31	90	3	0.5 (1"=20' scale: 10)
Water mainlines (double line pipe fill)	DOTS	0	7	0.5 (1"=20' scale: 10)
Asphalt paving for HMA and WMA surfaces	DOTS	45	22	0.5 (1"=20' scale: 10)
Base paving (when asphalt hatch pattern is overlaid on top)	DOTS	45	2	1.5 (1"=20' scale: 30)
Cement concrete paving for roadways	CHKDS	45	2	1.0 (1"=20' scale: 20)
Cement concrete paving for driveways	CHKDS	45	7	0.375 (1"=20' scale: 0.75)
Cement concrete paving for sidewalks & bike ways (non-roadway)	AR-CONC	45	7	0.05 (1"=20' scale: 1)
Gravel roadways (legend needed)	GRAVEL	0	7	0.25 (1"=20' scale: 5)
Unpaved roadways (legend needed)	DASH	0	7	0.5 (1"=20' scale: 10)
Pond bottom areas (legend needed)	AR-SAND	0	1	0.05 (1"=20' scale: 1)
Turf planting areas (legend needed)	GRASS	0	1	0.167 (1"=20' scale: 3.3)
Clearing and grubbing (legend needed)	ANSI31	0	7	1.0 (1"=20' scale: 20)
Stabilized construction entrances	GRAVEL	0	2	0.5 (1"=20' scale: 10)

4.3 RECORD DRAWING STANDARDS

Record Drawing Layers

For record drawing layers, replace the discipline designator of civil layers with CR, landscaping layers with LR, electrical layers with ER, structural layers with SR, mechanical layers with MR and architectural layers with AR and use as-built/record drawing colors found in the plot style table

Special Layers

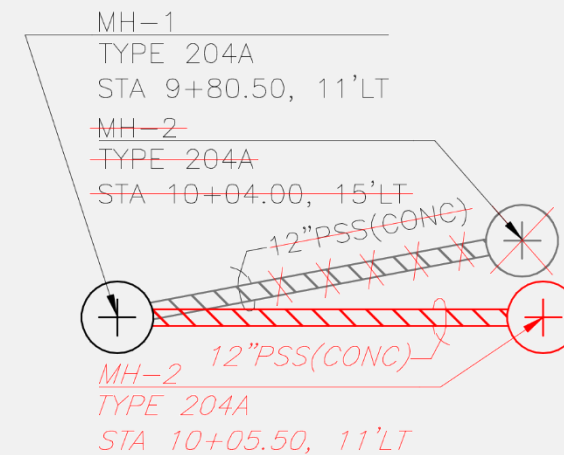
- *-NBLT used for features that were not built
color: 145
linetype: matches original object
- *-ANNO used for record drawing annotation
color: 37
linetype: continuous

Civil Record Drawing Standards

Items not built must be put on the CR-NBLT layer (color 145) and crossed out with the CR-ANNO layer (not deleted).

New/revised linework showing the as-built work shall be drawn on top of the original design.

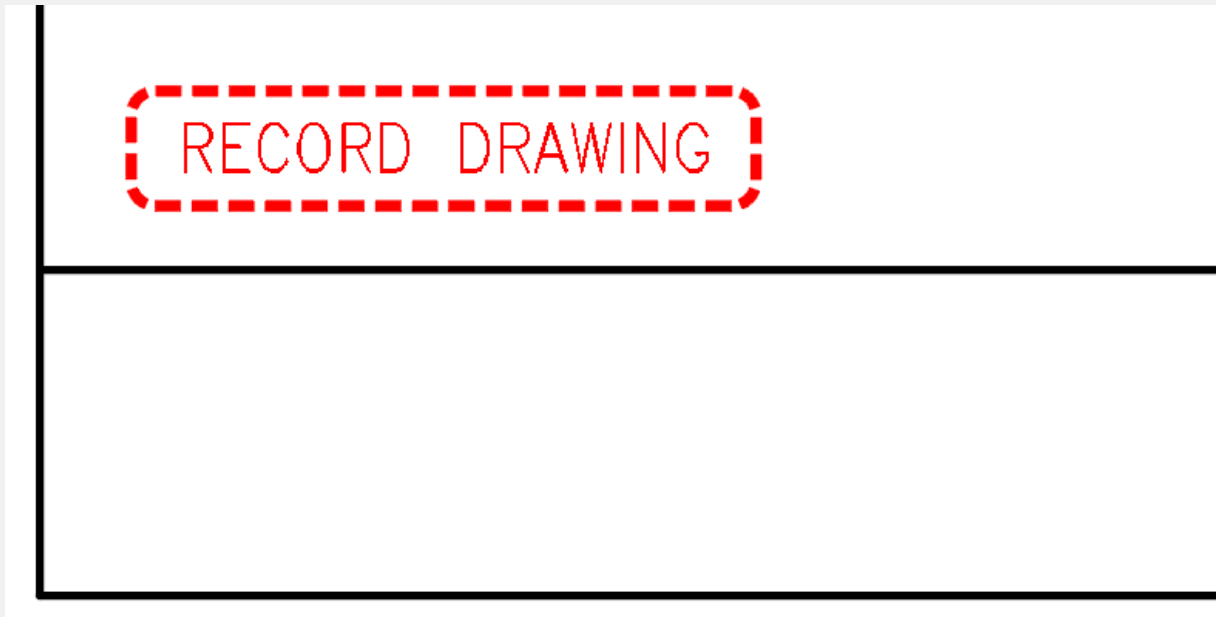
Record drawing layers must use colors 32-38.



4.3.1a RECORD DRAWING SHEETS (1 OF 2)

Record drawing sheets must be stamped with the *RD-Stamp.dwg* block on layer GR-ANNO, found here:
[...\Civil\01-Support](#)

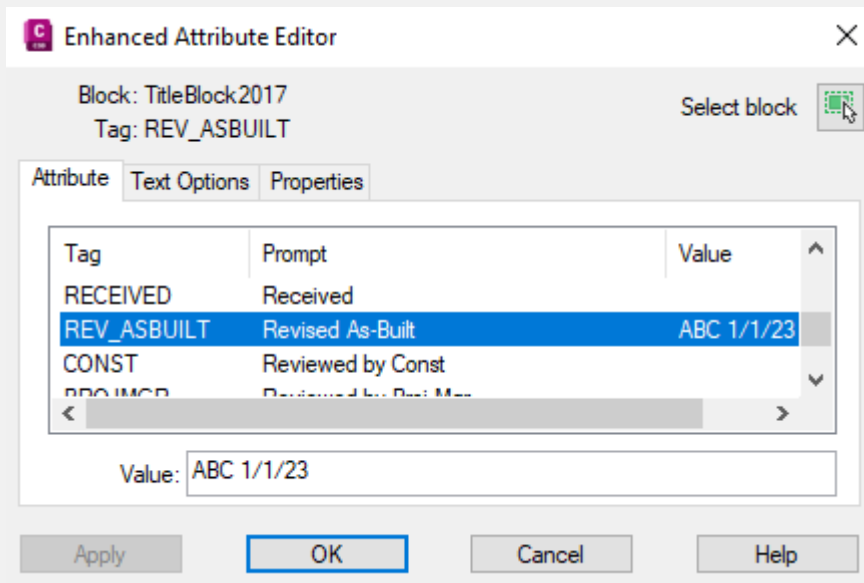
The stamp will plot red using the [COS_CADD_standard.ctb](#):



4.3.1b RECORD DRAWING SHEETS (2 OF 2)


The drafter must initial and date the sheets.

For SPU/SDOT sheets, edit the REV_ASBUILT attribute in each sheet and enter the drafter initials followed by the date as shown below (plots in red):



Enhanced Attribute Editor

Block: TitleBlock2017
Tag: REV_ASBUILT

Select block 

Attribute | Text Options | Properties

Tag	Prompt	Value
RECEIVED	Received	
REV_ASBUILT	Revised As-Built	ABC 1/1/23
CONST	Reviewed by Const	
DDO MCD	Reviewed by Dist Man	

Value: ABC 1/1/23

Apply OK Cancel Help



REVISED AS BUILT *ABC 1/1/23*



City of Seattle

BIM Standards

SECTION 5: Project Deliverable Guides



5.0 PROJECT DELIVERABLE CHECKLIST

30% Submittal Checklist

- Setup facility models per [3.3+](#), if applicable.
- Setup sheets with [cover sheet](#) and index per [3.4+](#).
- Professional stamps (color 254), North arrows, and bar scales placed on sheets where required.
- [Survey control sheet](#) with datum info and PLS stamp.
- Authoritative drawings created per [4.0.1+](#).
- Civil assets created per [4.0.2+](#) and [4.0.3+](#).
- XREFs setup per [4.0.4+](#).
- Annotation formatting per [4.1+](#).
- Hatch patterns per [4.2+](#).
- Title block scales are correct:
 - plan only format: 1"=20'
 - plan + profile format: H. 1"=20', V. 1"=10'
 - details and cover sheet format: AS NOTED
 - notes, schedules, tables, etc. format: NONE

60% Submittal Checklist

- Station & offset labels are shown on all proposed features (may be included in tables).
- [VPI and Vault Serial Numbers](#) acquired and added to title blocks.
- Civil assets modeled with standard object types per [4.0.3+](#).

90%, 100% Submittal Checklist

- Elevation labels are shown on all proposed features where required (may be included in tables).
- Check to ensure drawings conform to [4.0+](#).
- Sheets plotted per [5.1+](#) with standard [CTB](#).
- Facility information model deliverables prepared per [5.2+](#).
- Civil assets published to ArcGIS per [5.3+](#).



5.1 PROJECT DELIVERABLE: PUBLISH PLAN SHEETS

PDF Sheets for Reviews with Bluebeam or Acrobat

Publish plan sheets to PDF format for reviews with Bluebeam® or Acrobat®.

DWFX Sheets for Reviews on Autodesk Docs®

[Publishing plan sheets](#) to DWFX format is recommended for reviews hosted on Autodesk Docs® because DWFX files render lineweights better than PDF files when viewed in a browser.

Review Markup Standards

- **RED**: new/revised linework or text to be added or modified in the drawings
- **GREEN**: deletions
- **BLUE**: clarifying comments

PDF Sheets for Signature and/or Archival

Publish sheets using the standard [CTB](#) to PDF format for bid/conformed plan sets, and as-built plan sets.

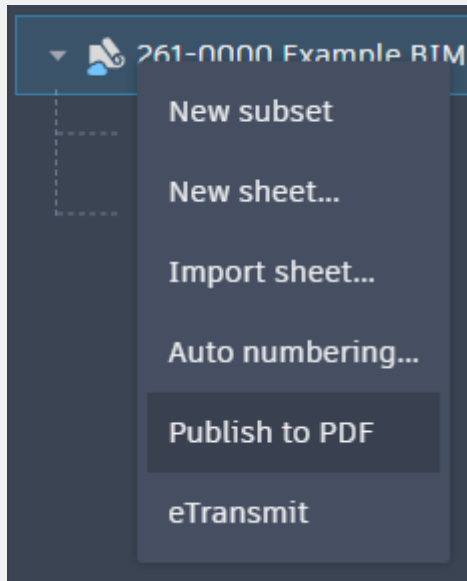
- Professional seals must be screened back 50% (color 254) so that electronic signatures are visible on them.
- PDFs prepared for electronic signatures must have layers disabled so entities cannot be hidden.
- PDFs must be signed with electronic signatures, per the State of Washington Board of Registration for Professional Engineers and Land Surveyors. This means that simply putting a likeness (image or vector) of your signature on PDFs does not meet the standard. When the plan set is ready to be e-signed, publish plans in PDF format (with layers disabled) and provide a list of required signatories' names, e-mail addresses, and phone numbers. Documents will be provided to City of Seattle Adobe Sign administrator and routed for e-signatures.

Final design and [record drawing](#) PDF files must be submitted to the City of Seattle [Records Vault](#) for archival.



5.1.1 BATCH PLOTTING

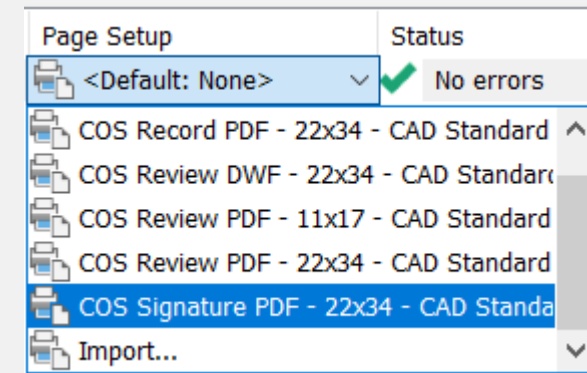
It is possible to publish to PDF directly from Sheet Set Manager. This uses the default layout of each sheet along with the CTB stored in the *01-Support* folder.



It is also possible to run the *PUBLISH* command and add layouts to the list of drawings to batch plot.

To apply standard plot configurations to layouts (such as 11x17 PDFs for review, or 22x34 PDFs with layers disabled for signatures), use page setups that are pre-configured for different purposes.

Shift + select all the layouts and set the page setup to the desired output.





5.2 PROJECT DELIVERABLE: FACILITY ASSET INFORMATION MODELS

Facility Deliverable Requirements: Asset Information Model

According to the NBS, “the Asset Information Model or AIM is a term used to describe the collated set of information gathered from all sources that supports the ongoing management of an asset”.

The City of Seattle requires three AIM deliverables:

- The native information models (e.g. Revit® files, Plant 3D® files, etc.) created on the CDE.
- [Project Asset List \(PAL\)](#) for enterprise asset management system integration.
- [Federated 3D Information Model](#), 3D design and as-built snapshots for archival.



5.2.1 PROJECT ASSET LIST (PAL)

Plant 3D® PAL

Configure [Plant 3D® Data Manager](#) to export the PAL.

Revit® PAL

Install the [Autodesk Interoperability Tools](#) to configure and export the PAL in COBie format.

5.2.2 PUBLISH FEDERATED 3D INFORMATION MODELS

Installing Navisworks Manage will enable the *NWCOUT* command in Civil 3D®. To enable NWC exports from Plant 3D® or Revit®, install the [Navisworks® NWC Export Utility](#).

Follow these steps to create multi-discipline model coordination files in the following folder:

...\Shared



STEP 1: Export the NWC model from the authoring applications (in Civil 3D® or Plant 3D®, isolate the 3D objects, and run the *NWCOUT* to export the 3D objects to Navisworks format to an Autodesk Docs® “shared” folder). The objects or layers must have a material associated; otherwise, geometry displays as the global material, which is grey/white.

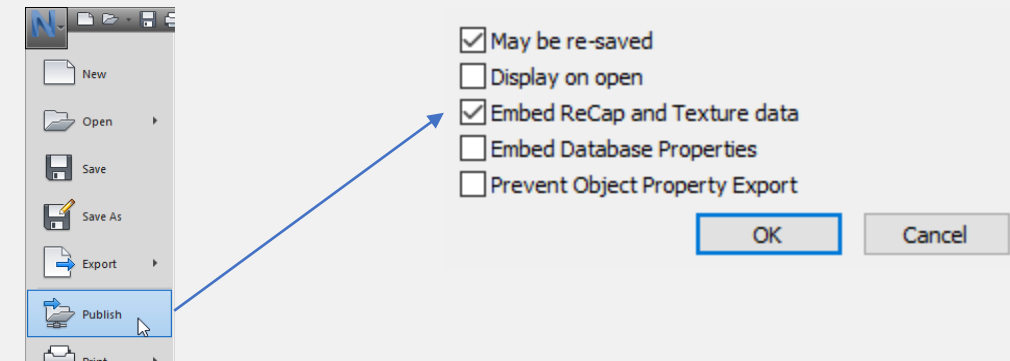
STEP 2: Launch Navisworks Manage®, create a new blank file, and follow steps A and B on the right to append and orient the NWC files stored on Autodesk Docs®.

- A. [Append Files](#) ([video](#)):
Click *Home* tab → *Project* panel → *Append*

Browse to load NWC files stored in a “shared” folder on Autodesk Docs®. This will append them to the current Navisworks® file (click *Viewpoint* tab → *Render Style* panel → *Mode* drop-down and select *Full Render* to see the materials applied).

- B. [Adjust Model Orientation](#) (if needed).

STEP 3: [Publish NWD Model](#): Click the  button and select  Publish (be sure to embed texture data).



Final design and as-built NWD models must be submitted to the City of Seattle [Records Vault](#) for archival.



5.3 PROJECT DELIVERABLE: PUBLISH GIS DATA

Object Types

In Civil 3D®, collections of assets must be created in separate drawings with the following object types:

- Pipe Networks for gravity drainage and wastewater (DWW) systems.
- Feature Lines and Cogo points for pressure utility systems (water, irrigation, sewer force mains, etc.).
- Feature Lines and Cogo points for electrical and signal site plans.
- Feature Lines for ADA ramps and paving edges.
- Cogo points for trees and signs.

Object Properties

Use the *DWGP*ROPS command to add global project information to objects (switch to “custom” tab and fill in fields as defined in the BIMxp). Save the drawing.

Add additional data to objects in the “extended data” tab of the Properties palette (use CTRL+F to add sheet fields).

Publishing to ArcGIS®

Save each drawing and use *Autodesk Connector for ArcGIS* (the *ArcGISPublish* command) to publish data.

- [Internal staff](https://gis.seattle.gov/portal) connect to: *https://gis.seattle.gov/portal*
- [External partners](https://www.arcgis.com) connect to: *https://www.arcgis.com*

➤ “Service Name”: use the following format:

[category]_[discipline code]_[plan number] _[milestone #] _[optional site]

category: use **V** for survey, **C** for civil design, **AB** or as-built, **CR** for civil record drawing.

discipline code: use the major layer discipline code for the objects that you are publishing (for example: use **SSWR** for sanitary sewer | **TOPO** for survey).

plan number: enter the VPI but replace the dash (-) with an underscore (_).

milestone #: use **90** for 90% complete and use **100** for 100% complete. Surveyors must use the YYYYMMDD date format here.

optional site: optional unique site name.

➤ “Tags”: add the VPI and PTN, as defined in the BIMxp.

➤ “Advanced Settings”: you must share the data to your City of Seattle departmental group.



City of Seattle

BIM Standards **Credits**



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City of Seattle

BIM Standards **Change Log**



DOCUMENT CHANGES

03/31/2023 First edition of the City of Seattle BIM Standards.